

ASTROSPORINA (AGARICALES) IN INDOMALAYA
AND AUSTRALASIA

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(With 32 Text-figures)

Keys, descriptions and illustrations are given of 30 species of *Astrosporina* Schroeter (1889; Agaricales) until now known from the region between India and Australia. Of these 30, 21 species and one variety are new. The others, partly critical or insufficiently documented, of which types or authentic material have been studied, are discussed. *Astrosporina* species from New Zealand have been studied earlier (Horak, 1977).

From Indomalaya and Australasia there is still scarce information available about number, occurrence and distribution of the species belonging to the genus *Astrosporina* Schroeter (1889: Kryptogamenfl. Schlesien 2:576). To our knowledge *Astrosporina* is reported from the following countries only: India (Masee, 1904), Sri Lanka (Ceylon; Petch, 1917), Indonesia (Java; Boedijn, 1951), Australia (Cleland, 1933, 1934) and New Zealand (Horak, 1971, 1977).

By tradition (Fries, 1863; Masee, 1904; Heim, 1931; Kühner & Boursier, 1932; Kühner & Romagnesi, 1953; Singer, 1975; Moser, 1978) the numerous described species of *Inocybe* (Fr.) Fr. (typified by *Agaricus geophyllus* Fr., with smooth spores) are conventionally grouped into two subgenera:

1. for smooth-spored species: subgen. *Inocybium* Earle 1909 (syn. *Agmocybe* Earle 1909)
2. for gibbous-spored species: subgen. *Clypeus* (Britzm.) Fayod 1889 (subgen. *Inocybe* sensu Singer, Moser and other authors is illegitimate).

In 1889 Schroeter introduced the genus *Astrosporina* (=subgen. *Clypeus*) to accommodate *Inocybe*-like species with the major morphologic features: Pileus convex, umbonate or acute-papillate; stipe central, cylindric, equal or marginate-bulbous at base; veil remnants absent or present; spore print brown; spores nodulose, gibbous, stellate or spinose; cystidia often metuloid and encrusted with crystals; odour frequently characteristic.

This typification demonstrates clearly that the morphology of the spores is a principal character in separating *Astrosporina* from *Inocybe*. In the field only the collector who is very much familiar with the local fungus flora will recognize *Astrosporina* and *Inocybe* and needless to say there are numerous species whose spores can be considered as intermediate between the two types mentioned above (compare in this paper *A. imbricata* Clel.).

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Nevertheless I follow Schroeter's concept in separating *Astrosporina* from *Inocybe*. Firstly because *Astrosporina* is the first proposal (on generic rank) to name and to unify gibbous-spored species formerly classified in *Inocybe* (Horak, 1967: 646; compare remarks on *ClYPEUS* (Britzm.) Fayod), secondly the name indicates typical characters of the genus i.e. its species and thirdly the ever growing number of new species is allotted from the beginning to two genera distinguished by significant microscopic features.

The results presented in this contribution have been obtained from material of different provenience. The majority of collections have been gathered by the author and by Prof. E. J. H. Corner (Cambridge, U.K.). Again I am very grateful to Prof. Corner who offered for studies his rich collections (dried and preserved in formaline) from the tropical Far East. A third source of information comes from type and authentic material sent on loan by the curators of the herbaria ADW, BO, CAN, E, FH, K, PDD.

Concerning field work I have to thank for the facilities provided by the Department of Forests, Forest Research Centre, Bulolo, Papua New Guinea and the Herbarium Bogor, Indonesia. Finally I am indebted to the Swiss Society of Natural Sciences by financing a collecting expedition to New Caledonia and Indonesia in 1977.

Type material of the new species is kept in ZT and in the personal herbarium of Prof. Corner.

If not otherwise stated the magnifications of the figures are: carpophores (nat. size), spores ($\times 2000$), basidia and cystidia ($\times 1000$) and vertical section of cuticle ($\times 500$).

KEY TO THE INDOMALAYAN AND AUSTRALASIAN SPECIES OF *Astrosporina*

(The New Zealand species are keyed out in Horak, 1977.)

1. Base of stipe clavate, bulbous or marginate 2
- 1*. Stipe cylindric and equal from apex to base 12
2. Stipe fibrillose (pruinose in uppermost part only); veil remnants present (at least in young specimens visible). Compare also *A. neoumbrina* (no. 16; p. 182) 3
- 2*. Stipe conspicuously pruinose over whole length 5
3. Pileus — 30 mm, convex to plane with conic umbo, pale ochraceous, covered with fuscous fibrils; stipe — 35 \times 3 mm, white when young; odour not distinctive; spores 6–8 \times 5.5–7 μ m, nodulose; cystidia apically metuloid, crystals absent; on soil in forests. Singapore 27. *A. mediocris*, p. 198
- 3*. Stipe with conspicuous persistent submembranous *Telamonia*-like belts of veil, especially in lower two-thirds (compare also *A. olivaceonigra* f. *volvata* (24b, p. 195)) 4
4. Pileus — 70 mm, umbonate, bright yellow, squarrose-scaly; stipe — 75 \times 8 mm, yellowish, with orange girdles of veil; odour not spermiatic but strong; spores 8–10 \times 5–6 μ m, nodulose; cystidia broadly fusoid, hyaline, metuloid, crystals rare; on soil in forests (under *Quercus*). Malaysia. 10. *A. squarrosolutea*, p. 175
- 4*. Pileus — 60 mm, conic, brown, squamulose-squarrose; stipe — 120 \times 4 mm, very slender, concolorous with pileus, veil remnants pale brown; odour not distinctive; spores 10–13 μ m, subglobose, with isolated conic (up to 3 μ m long) projections; cystidia yellowish, metuloid, crystals present; on soil (under *Lithocarpus*, *Castanopsis*). Papua New Guinea, Sabah 4. *A. gemina*, p. 166

5. Context and lamellae reddening on bruising (drying specimens turn reddish also); pileus -35 mm, conicoconvex, argillaceous to orange-brown with distinct reddish tint, smooth to fibrillose; stipe -50 x -3 mm, concolorous with pileus; odour sweet, fruity; spores 6,5-8,5 x 5-6 μ m, angular to nodulose; cheilocystidia cylindric to clavate, thin-walled, crystals absent; pleuro- and caulocystidia metuloid, hyaline to yellowish, crystals present; on soil in forests. Papua New Guinea; Europe (type) 1. *A. bresadolae*, p. 162
- 5*. Context and lamellae not changing colour on bruising 6
6. Pileus orange to apricot, -30 mm, umbonate, glabrous-fibrillose; lamellae orange; stipe -45 x -5 mm, orange; odour unpleasant, like burnt horn; spores 5,5-8 x 5-6 μ m, nodulose; cystidia metuloid, hyaline to yellowish, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea; Japan (type) 26. *A. lutea*, p. 197
- 6*. Pileus, lamellae and stipe with different colour 7
7. Marginate bulb (of stipe) with persistent, membranous, volvate, white remnants of veil; pileus olive-brown; on soil in forests (under *Castanopsis*, *Lithocarpus*). Papua New Guinea. (The other characters correspond with those of the type variety.) 24b. *A. olivaceonigra* f. *volvata*, p. 195
- 7*. Volva and other veil remnants on stipe absent 8
8. Spores 15-17 μ m, with conspicuous conic projections up to 3 μ m long, apex often bifurcate; pileus -60 mm, conic to umbonate, brown, fibrillose-squamulose or squarrose; stipe -200 x -6 mm, slender, reddish brown; odour not distinctive; cystidia hyaline to yellowish, metuloid, crystals present; on soil in forests (*Lithocarpus*, *Castanopsis*). Malaysia, Java, Papua New Guinea; Ceylon (type) 3. *A. petchii*, p. 164
- 8*. Spores different 9
9. Spores < 10 μ m; margin of pileus becoming split with age 10
- 9*. Spores > 10 μ m; pileus convex with conic umbo; odour (absent or) slightly spermatic 11
10. Odour sweet or fruity; lamellae normally spaced; pileus -40 mm, with distinct conic papilla, brown, squarrose at disc; stipe -45 x -3 mm, pale red-brown; spores 8-10 x 7-8,5 μ m, nodulose; cystidia metuloid, yellow, crystals absent; on soil in forests (*Castanopsis*, *Lithocarpus*). Java; Japan (type). 28. *A. titibuensis*, p. 199
- 10*. Odour spermatic (at least in aged specimens); lamellae very crowded and narrow; pileus -40 mm, convex to umbonate-campanulate, whitish, yellowish or ochraceous-argillaceous, centre smooth to fibrillose; stipe -75 x -3 mm, often rather slender, concolorous with pileus; spores 6,5-9 x 4,5-6 μ m, nodulose; cystidia metuloid, hyaline, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea, Java, Sabah. 25. *A. angustifolia*, p. 195
11. Spores 9-11 x 7-9 μ m, nodulose, knobs hemispheric or conic; pileus -40 mm, yellowish to pale brown; stipe -50 x -4 mm; cystidia hyaline to yellowish, metuloid, crystals present; on soil in forest (*Nothofagus*). Papua New Guinea; New Zealand (type) 29. *A. avellana*, p. 200
- 11*. Spores 10-14 x 8-12 μ m, with distinct conic projections, stellate; pileus -35 mm, pale brown to fuscous, margin rimose with age; stipe -60 x -4 mm; cystidia yellow to yellow-brown, metuloid, crystals present; on soil in forests. Sabah, Malaysia; Europe (type), Japan, New Zealand. 30. *A. asterospora*, p. 202
- 12(1*). Stipe conspicuously pruinose over whole length; veil remnants absent 13
- 12*. Stipe fibrillose (not pruinose except uppermost part), tomentose or lanuginous especially towards base, often with conspicuous veil remnants (cortina, belts of veil) 19
13. Pileus and stipe white, -25 mm, umbonate-campanulate, viscid, rimose towards margin; stipe -40 x -2 mm; odour spermatic; spores 6-7,5 x 5,5-6,5 μ m, nodulose, projections (knobs) hemispheric and often crested; cystidia hyaline, very thick-walled, crystals present; on soil in lowland forests. Papua New Guinea 22. *A. albobiscida*, p. 191
- 13*. Pileus and stipe not white; cuticle of pileus dry 14
14. Pileus and stipe lilac to violaceous; pileus -50 mm, convex with acute umbo, fibrillose-rimose; stipe -50 x -8 mm, robust, fibrillose towards base; odour acidulous; spores 7-8 x 5,5-6 μ m, nodulose; cystidia hyaline, thin-walled, occasionally with resinous crust at apex; on soil in montane forests. Sabah 18. *A. corneri*, p. 184

- 14*. Pileus and stipe with different colour(s) 15
15. Pileus, lamellae and stipe yellow (at least in young specimens); pileus—30 mm, convex to campanulate, brown squarrose scales at centre, margin appendiculate from brown membranous lumps of veil; stipe—45 × 5 mm, below fibrillose cortina with several incomplete appressed brown belts of veil; odour fishy; spores 7,5–10 × 5,5–7,5 μ m, nodulose; cystidia yellowish, metuloid near apex only, crystals present; on soil in montane forests (*Nothofagus*). Papua New Guinea (compare *A. neoumbrina*, p. 182). 11. *A. luteifolia*, p. 176
- 15*. Pileus fuscous, brown, pale brown, argillaceous or pale yellow-brown, occasionally with distinct olive or wine red tint over disc of pileus or in context of stipe 16
16. Pileus fuscous to black-brown with distinct olive tint at disc, —30 mm, conic to campanulate, fibrillose; stipe—45 × 2 mm, slender, pale brown (base submarginate-volvate in var. *volvata*, 24b, p. 195); spores 8–9,5 × 5,5–6,5 μ m, nodulose; cystidia hyaline, metuloid, crystals present; on soil in forests (*Castanopsis*). Papua New Guinea 24a. *A. olivaceonigra*, p. 194
- 16*. Pileus with paler colour, olive tint absent 17
17. Pileus—25 mm, umbonate, fuscous turning fawn with age, covered with small squarrose scales; stipe—30 × 3 mm; odour not distinctive; spores 10–12 × 8–11 μ m, ovoid with conspicuous conic projections; cystidia yellow, metuloid, apex encrusted with resinous cap; on soil in forests. Malaysia 6. *A. pahangi*, p. 168
- 17*. Carpophores fragile, pileus—10 mm; stipe—1 mm diam. 18
18. Pileus—8 mm, argillaceous to pale fuscous, densely covered with strigose white hairs, margin fimbriate; stipe—10 × 0,5 mm, concolorous with pileus; odour fruity or spermatic; spores 6–7,5 × 4,5–5,5 μ m, inconspicuously nodulose; cystidia hyaline to pale yellow-brown, metuloid, crystals present; on soil or on rotten wood. Papua New Guinea, Singapore. 2. *A. pusillima*, p. 163
- 18*. Pileus—10 mm, campanulate, yellow-brown to dark brown, scurfy to granular at apex, viscid (if moist); stipe—25 × 1 mm, yellow-brown to reddish brown; odour pleasant but changing to spermatic (after cutting); spores 6,5–7,5 × 5–6 μ m, nodulose; cheilocystidia vesiculose, thin-walled; pleuro- and caulocystidia yellow, metuloid, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea 23. *A. granuloseiceps*, p. 191
19. Context (in pileus and stipe) wine red; pileus—40 mm, convex to plane, umber to red-brown, squarrose-scaly; stipe—60 × 7 mm, robust, concolorous with pileus, coarsely fibrillose to sub-squarrose; lamellae red-brown; odour not distinctive; spores 6–8,5 × 5,5–6,5 μ m, nodulose; cheilocystidia vesiculose, thin-walled, with conspicuous red-brown plasmatic pigment, crystals absent; caulocystidia absent; on soil in montane forests (*Nothofagus*). Papua New Guinea. 19. *A. magnifica*, p. 186
- 19*. Context of pileus and stipe not wine red 20
20. Spores with distinct, \pm isolated conic projections with acute tips 21
- 20*. Spores nodulose, projections (knobs) indistinct, hemispheric or conic with obtuse tips 22
21. Pileus—30 mm, conico-convex to campanulate, argillaceous to pale brown, squarrose; stipe—75 × 4 mm, with small squarrose scales towards base, cortina fugaceous; odour pleasant; spores 7,5–10 μ m, subglobose, projections up to 3 μ m long, numerous; cheilocystidia clavate, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in forests (*Lithocarpus*, *Castanopsis*). Papua New Guinea. 5. *A. echinosimilis*, p. 168
- 21*. Pileus—25 mm, conico-convex with acute papilla, ochraceous to fuscous, striate-sulcate towards margin, fibrillose; stipe—45 × 1,5 mm, concolorous with pileus, pinkish fibrils below subsistent fibrillose cortina; odour none; spores 10–12,5 × 8,5–11 μ m, subglobose to ovate, projections rather scattered; cystidia thin-walled, with yellow plasmatic pigment, crystals absent; on soil in forests. Singapore, Malaysia. 7. *A. hydrocymbiformis*, p. 170
22. Knobs on spores low, indistinctly nodulose in profile 23
- 22*. Knobs on spores distinct, i.e. crested, obtusely conic or hemispheric 24
23. Spores 9–12 × 5–6,5 μ m; pileus—16 mm, umbonate-campanulate, brown, fibrillose to scaly; stipe—25 mm long, pale brown; odour?; cystidia brown at apex, metuloid, crystals rare; on soil. Australia 21. *A. imbricata*, p. 190

- 23*. Spores $6-7.5 \times 4.5-6 \mu\text{m}$; pileus -20 mm , umbonate-campanulate, dark brown with reddish or olive tint; stipe $-30 \times -2 \text{ mm}$, base bulbous (occasionally submarginate), yellow, with coarse whitish fibrils towards base; odour absent; cystidia hyaline, thick-walled (at apex only), crystals scattered; on soil in forests (under Fagales). Papua New Guinea; Japan (type). 16. *A. neoumbrina*, p. 182
24. Majority of projections crested or obtusely bifurcate 25
- 24*. Projections (knobs) hemispheric or obtusely conic 26
25. Spores $10.5-13 \mu\text{m}$, subglobose; cheilo- and pleurocystidia hyaline to yellowish, metuloid, crystals present; pileus -15 mm , campanulate, squarrose at disc, brown; stipe $-50 \times -2 \text{ mm}$, fibrillose to villous from white to ochraceous fibrils; odour absent; on soil in forests (under Fagales). Papua New Guinea 8. *A. lasseroides*, p. 173
- 25*. Spores $8-10.5 \times 7-8.5 \mu\text{m}$; cheilocystidia with yellow plasmatic pigment, thin-walled, crystals absent; pileus -14 mm , conic to subumbonate, fawn to pale brown, covered with minute fibrillose squamules; stipe $-20 \times -1.5 \text{ mm}$, fibrillose; odour none; on soil in forests. Singapore 9. *A. alienospora*, p. 173
26. Growing on rotten wood; pileus -30 mm , umbonate, dark brown, squamulose-squarrose; stipe $-30 \times -5 \text{ mm}$, pale brown with whitish fibrils especially towards base; odour none; spores $9-11 \times 7.5-8.5 \mu\text{m}$, substellate to nodulose; cystidia hyaline, thin-walled or metuloid, crystals absent or scattered. Sabah; New Zealand (type) 15. *A. paracerasphora*, p. 181
- 26*. Growing on soil 27
27. Spores large, stellate, $11-13.5 \times 8-10 \mu\text{m}$; basidia 2-spored; cheilo- and pleurocystidia capitate, hyaline, thin-walled, crystals absent; pileus -30 mm , conic, dark brown, squarrose-scaly; stipe $-75 \times -3 \text{ mm}$, concolorous with pileus, brown subsquarrose squamules towards base; odour none; on soil in montane forests (*Nothofagus*). Papua New Guinea. 20. *A. aberrans*, p. 187
- 27*. Spores smaller; cystidia never capitate, always metuloid (at least pleurocystidia) 28
28. Spores $10-12 \times 7.5-8.5 \mu\text{m}$; pileus -25 mm , convex with prominent conic papilla, brown, centre subsquarrose-scaly; stipe $-45 \times -2 \text{ mm}$, pale ochraceous fibrils especially towards base, cortina absent; cheilocystidia clavate to vesiculose, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea 17. *A. papillata*, p. 183
- 28*. Spores smaller; pileus not conic-papillate but obtusely umbonate to campanulate, centre dotted, granular or minutely squarrose, not scaly 29
29. Spores $6-8 \times 5.5-7 \mu\text{m}$, subglobose to ovoid, with numerous low hemispheric knobs (reminding of blackberries); pileus -20 mm , centre conspicuously dotted or granular, dark brown to ochraceous-brown; stipe $-45 \times -2 \text{ mm}$, with white fibrils from cortina at apex, several brownish appressed belts from outer veil near base; odour strong, like *Pelargonium*; cheilocystidia clavate to vesiculose, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea. 13. *A. punctatosquamosa*, p. 178
- 29*. Spores nodulose, knobs obtusely conic and pronounced 30
30. Pileus -20 mm , hazel brown to dark brown, minutely squamulose-squarrose; stipe $-35 \times -2 \text{ mm}$, white, at apex with white fibrillose remnants from cortina, near base with indistinct white appressed belts from outer veil; odour strong, fruity or like *Pirola*; spores $6-9 \times 5-7.5 \mu\text{m}$; cheilocystidia clavate to vesiculose, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in sub-montane-montane forests (under Fagales). Papua New Guinea 14. *A. incognita*, p. 179
- 30*. Pileus -20 mm , umber brown, squarrose at centre; stipe $-40 \times -2 \text{ mm}$, concolorous with pileus, with white fibrillose belts from outer veil; odour absent; spores $7-8.5 \times 5.5-6.5 \mu\text{m}$; cheilocystidia clavate to broadly subfusoid, hyaline, sometimes with yellow-brown plasmatic pigment, thin-walled, crystals absent; pleurocystidia absent; on soil in forests. Singapore 12. *A. cingulatifipes*, p. 177

I. Sect. RUBELLAE Kühner & Boursier 1932

1. *Astrosporina bresadolae* (Mass.) Horak, *comb. nov.*—Fig. 1

Inocybe bresadolae Mass. in Ann. Bot. 18: 465. 1904 (basionym).

Description of material from Papua New Guinea:

Pileus 35 mm diam., conico-convex when young becoming campanulate or umbonate-expanded; argillaceous, brown or orange-brown, with distinct reddish or red-brown tint especially over disc; smooth when young, soon fibrillose at estriate margin, squamulose to scaly at centre; dry, veil remnants absent. Lamellae adnexed to subfree, ventricose, crowded (L -20, -5);

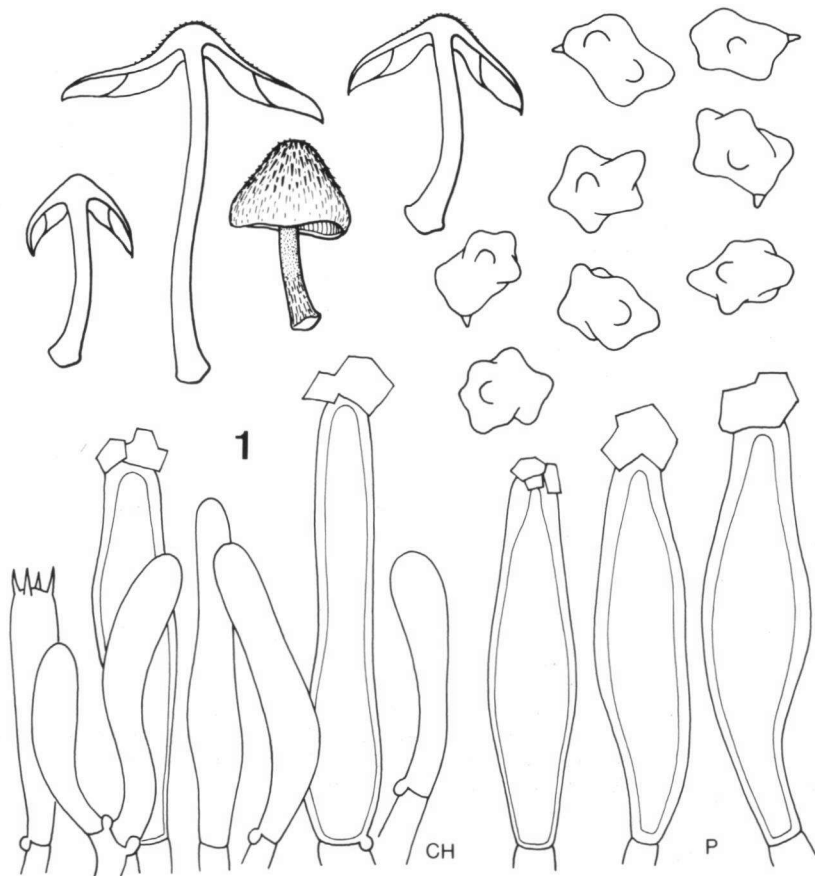


Fig. 1: *A. bresadolae* (Mass.) Horak (ZT 72/74): carpophores, spores, basidium and cheilocystidia (CH), pleurocystidia (P).

whitish or argillaceous turning brown, reddening after bruising, edge albofimbriate. Stipe 20–50 × 2–3 mm, cylindric, with distinct marginate base, often slender; whitish at apex, concolorous with pileus towards base, reddening when bruised; upper half pruinose, lower half appressedly fibrillose; dry, solid, veil remnants none, single or grown together, in groups. Context whitish or pale brown, slowly but conspicuously reddening. Odour strong, sweetly or fruity.

Spores 6,5–8,5 × 5–6 μ m, angular to nodulose, knobs hemispheric, often not distinct, yellow-brown. Basidia 30–36 × 6–8 μ m, 4-spored. Cheilo-, pleuro- and caulocystidia 45–75 × 8–18 μ m, subcylindric to slender fusoid, metuloid, hyaline or yellowish (KOH); cheilocystidia often intermixed with cylindric or subclavate, thin-walled hyaline cells, 30–60 × 5–10 μ m. Cuticle a cutis or trichoderm of cylindric hyphae (4–7 μ m diam.), with yellow-brown plasmatic and/or encrusting pigment. Clamp connections present.

HABITAT.—On soil in forest (under *Castanopsis*, *Lithocarpus*, *Nothofagus*). Europe (type), Papua New Guinea.

MATERIAL.—FRANCE: Oise, Croy-la-Forêt (under oak), 25.VI.1950, *Romagnesi* (S). — PAPUA NEW GUINEA: Eastern Highlands, Goroka, 13.I.1972, *Horak* (ZT 72/74); Same locality, 17.I.1972, *Horak* (ZT 72/87); Western Highlands, Mt. Hagen, Kuna, 18.V.1972, *Horak* (ZT 72/455).

On the Papua New Guinean material all characters observed agree well with those reported for this remarkable species from Europe (Kühner & Boursier, 1932: 158; Stangl, 1977: 131).

II. Sect. PETIGINOSAE Heim 1931

2. *Astrosporina pusillima* Corner & Horak, *spec. nov.* —Fig. 2

Pileus – 8 mm, convexo vel plano, fusco, albostrigoso-fibrilloso. Lamellis adnexis, argillaceis. Stipite –10 × 0,5 mm, cylindrico, cinnamomeo, pruinoso. Odore subspermatico. Sporis 6–7,5 × 4,5–5,5 μ m, nodulosis. Cystidiis metuloidis, incrustatis. Ad terram et lignum in silvis. Nova Guinea. Typus: ZT 73/273.

Pileus – 8 mm diam., hemispheric when young, soon becoming plane and expanded, occasionally subumbonate; argillaceous or pale fuscous, densely covered with strigose appressed white fibrils, especially towards the striate fimbriate margin; dry, veil remnants absent. Lamellae (L 6–8, 3) adnexed to almost free, ventricose; cinnamon to pale argillaceous, edge concolorous or albofimbriate. Stipe 4–10 × 0,5 mm, cylindric, equal, slender; concolorous with pileus, white pruinose all over; dry, solid, single, in groups. Context pale brown. Odour fruity or spermiatic, sometimes not distinctive.

Spores 6–7,5 × 4,5–5,5 μ m, nodulose, knobs not pronounced, brown. Basidia 20–26 × 4–6 μ m, 4-spored. Cheilo-, pleuro- and caulocystidia 30–50 × 12–18 μ m, lageniform, metuloid (membrane up to 3 μ m thick), with crystals at apex, hyaline or pale yellow-brown, numerous. Cuticle a cutis or trichoderm of fasciculate cylindric hyphae (2–5 μ m diam.), membranes hyaline, thick-walled, terminal cells not encrusted with pigment. Clamp connections present.

HABITAT.—On mossy soil or rotting wood, in forests. Papua New Guinea, Singapore.

MATERIAL.—PAPUA NEW GUINEA: Eastern Highlands, E. of Ayura (Kainantu), 27.V.1973, *Horak* (ZT 73/273, holotype). — SINGAPORE: Bukit Timah, Fern Valley, 19.IV.1941, *Corner* (ZT 78/43).

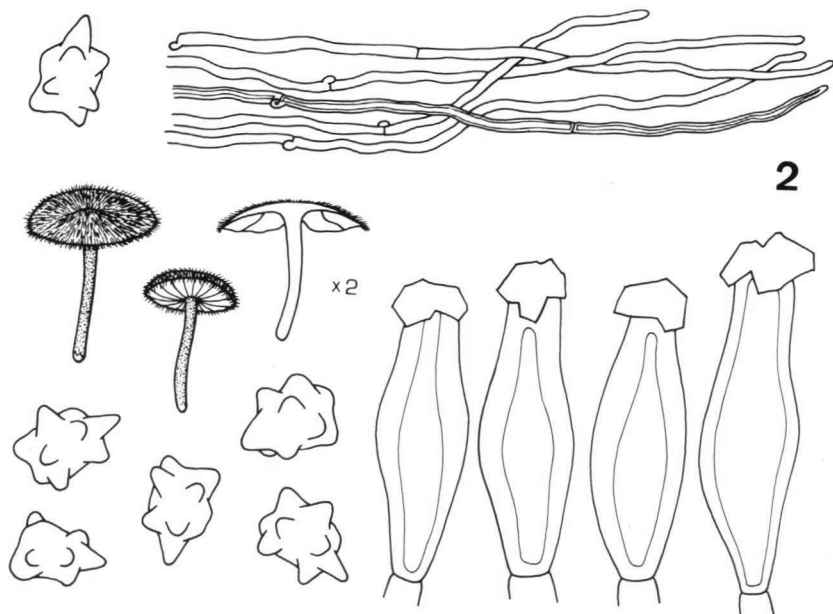


Fig. 2: *A. pusillima* Corner & Horak (ZT 78/43): carpophores ($\times 2$), spores, cheilocystidia, cuticle.

This species is closely related to *A. petiginosa* (Fr.) Rea. *A. pusillima*, however, is distinguished by its small and delicate size and the argillaceous lamellae.

III. Sect. CALOSPORA Lange 1917

3. *Astrosporina petchii* (Boed.) Horak, *comb. nov.*—Fig. 3

Inocybe petchii Boed. in Sydowia 5: 223. 1951 (basionym).

Inocybe umbonata Petch in Ann. R. bot. Gdns Peradeniya 6: 202. 1917 (non Quél. 1876).

Description of the Papua New Guinean material:

Pileus—60 mm, hemispheric or convex finally plane or subdepressed, with conic or umbonate centre; light brown to dark brown, rarely with reddish brown tinge; fibrillose when young, rimose towards the split margin, becoming squamulose or squarrose due to recurved scales; dry, veil remnants absent. Lamellae adnexed to subfree, ventricose, crowded; argillaceous or cinnamon, edge albofimbriate. Stipe—200 \times 6 mm, cylindric, equal or slightly attenuated towards apex, base with distinct (10 mm) marginate bulb; reddish brown all over, conspicuously pruinose over whole length, veil remnants absent; dry, solid or fistulose single in groups. Context whitish. Odour and taste not distinctive.

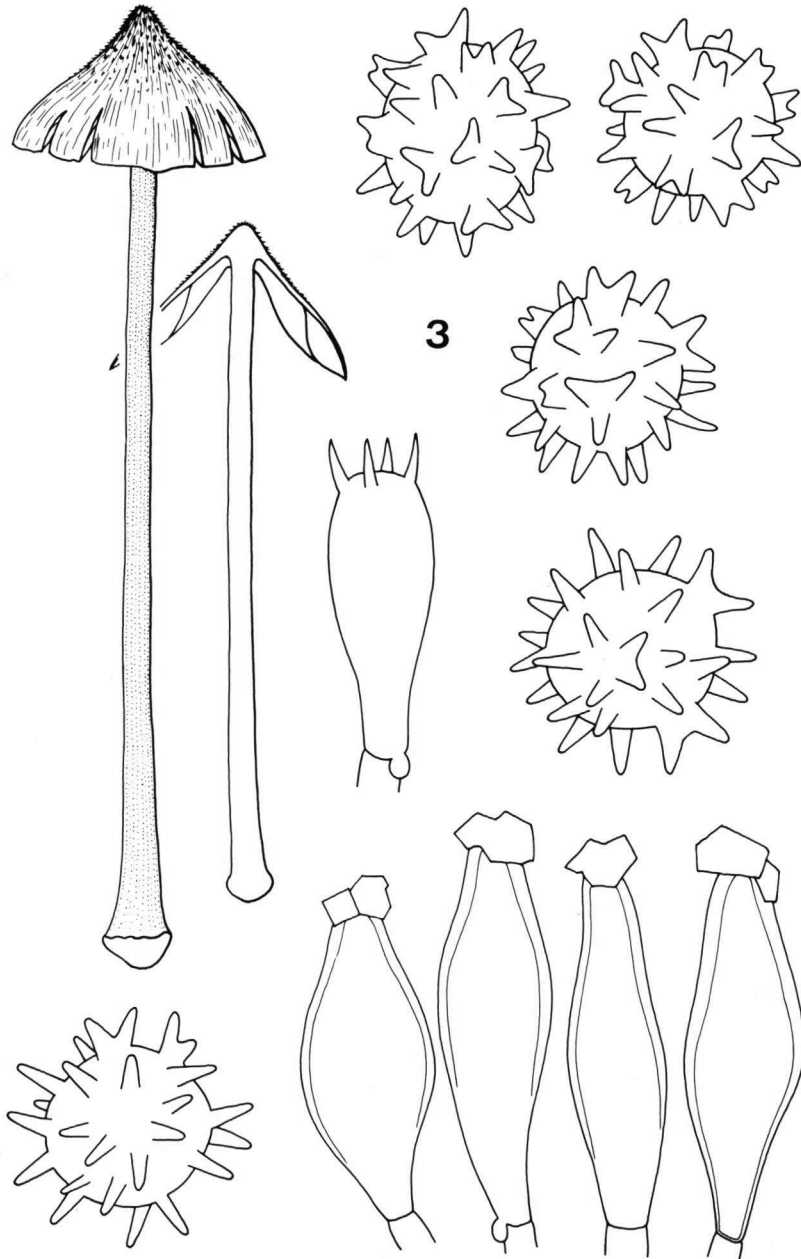


Fig. 3: *A. petchii* (Boed.) Horak (ZT 77/188): carpophores, spores, cheilocystidia.

Spores 15–17 μm , stellate, with up to 3 μm long conic or bifurcate projections, brown. Basidia 40–50 \times 12–20 μm , 4-spored. Cheilo- and pleurocystidia 35–70 \times 12–25 μm , fusoid or lageniform, metuloid (membrane up to 3 μm diam.), hyaline or yellowish (KOH), crystals present. Caulocystidia like cheilocystidia but larger, intermixed with clavate thin-walled cells. Cuticle a cutis or trichoderm of cylindric hyphae (3–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections on septa.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis* (Fagaceae). Ceylon (type), Malaysia, Java, Papua New Guinea.

MATERIAL.—CEYLON: Peradeniya, VII.1912, *Petch* 3499 (holotype of *I. umbonata* Petch, K). —MALAYSIA: Johore, Gunong Panti, 500 m; 7.IX.1930, *Corner* (ZT 78/44). —J A V A (INDONESIA): Bogor, Tjibodas, 1800 m, 11.IV.1972, *Corner* (J-5, ZT 79/190); Bogor, Tjibodas, 14.III.1977, *Horak* (ZT 77/188). —PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 25.IV.1972, *Horak* (ZT 72/476); Western Highlands, Mt. Hagen, Baiyer River, 22.V.1972, *Horak* (ZT 72/476).

Astrosporina petchii is one of the most outstanding species of the genus. Based upon the records hitherto known this fungus is probably common throughout tropical and temperature South East Asia. It is closely related to *A. gemina*. The two species have been found growing together in the oak forest of Papua New Guinea. However, there are no difficulties to separate them already in the field. *A. petchii* is characterized by the pruinose stipe and the lack of veil remnants on pileus and stipe.

According to notes and drawings kept in the Bogor Herbarium (BO), v. Overeem was well acquainted to this species (collected in the oak forests of Tjibodas). To him the large spinose spores appeared to merit creating a new but never published genus.

4. *Astrosporina gemina* Horak, *spec. nov.*—Fig. 4

Pileo 40 mm, conico-papillato vel conico-umbonato, ex avellaneo umbrino, castaneo tinctu, dense squamuloso, marginem versus e velo albo vel concolori oblecto, sicco, rimoso-striato. Lamellis adnatis, albidis dein argillaceis, fimbriatis. Stipite 120 \times 4 mm, cylindraco, ad basim sub-marginato (8 mm diam.), pileo concolori, toto e zonis pallide brunneis e velo multicingulato, sicco. Odore nullo. Sporis 16–18 μm , stellatis, luteobrunneis. Cheilocystidiis 25–55 \times 15–30 μm , ventricosos-fusoideis, metuloideis, crystal-liferis, stramineis. Ad terram in silvis *Lithocarpi*. Nova Guinea. Typus: ZT 72/425.

Pileus 10–40(–60) mm diam., conico-convex, convex with prominent conical umbo, mam-millate, hazel-nut brown, umber brown or deep brown, often with red-brown tinge, all over covered with concolorous small squamules, sulcate-striate towards the margin, which is covered with subsistent, white, membranaceous patches of veil, dry. Lamellae adnexed to emarginate-adnate, ventricose, crowded, whitish turning pale ochraceous or argillaceous, pale brown in mature carpophores, edge fimbriate. Stipe 50–120 \times 2–4 mm, cylindric or attenuated towards apex, base submarginate (8 mm diam.), concolorous with pileus, all over covered with incomplete belts or appressed squamules of concolorous or pale brown remnants of veil, not pruinose, solid becoming hollow, single in groups. Context red-brown in pileus and stipe, white in base of stipe. Odour none. Spore print brown.

Spores 10–13 μm , subglobose, with prominent conical projections (up to 3 μm long), rarely with saddle-shaped spines, yellow-brown. Basidia 35–45 \times 12–18 μm , 4-spored. Cheilocystidia 25–55 \times 12–18 μm , ventricose-fusoid or lageniform, metuloid, yellowish, encrusted with crys-

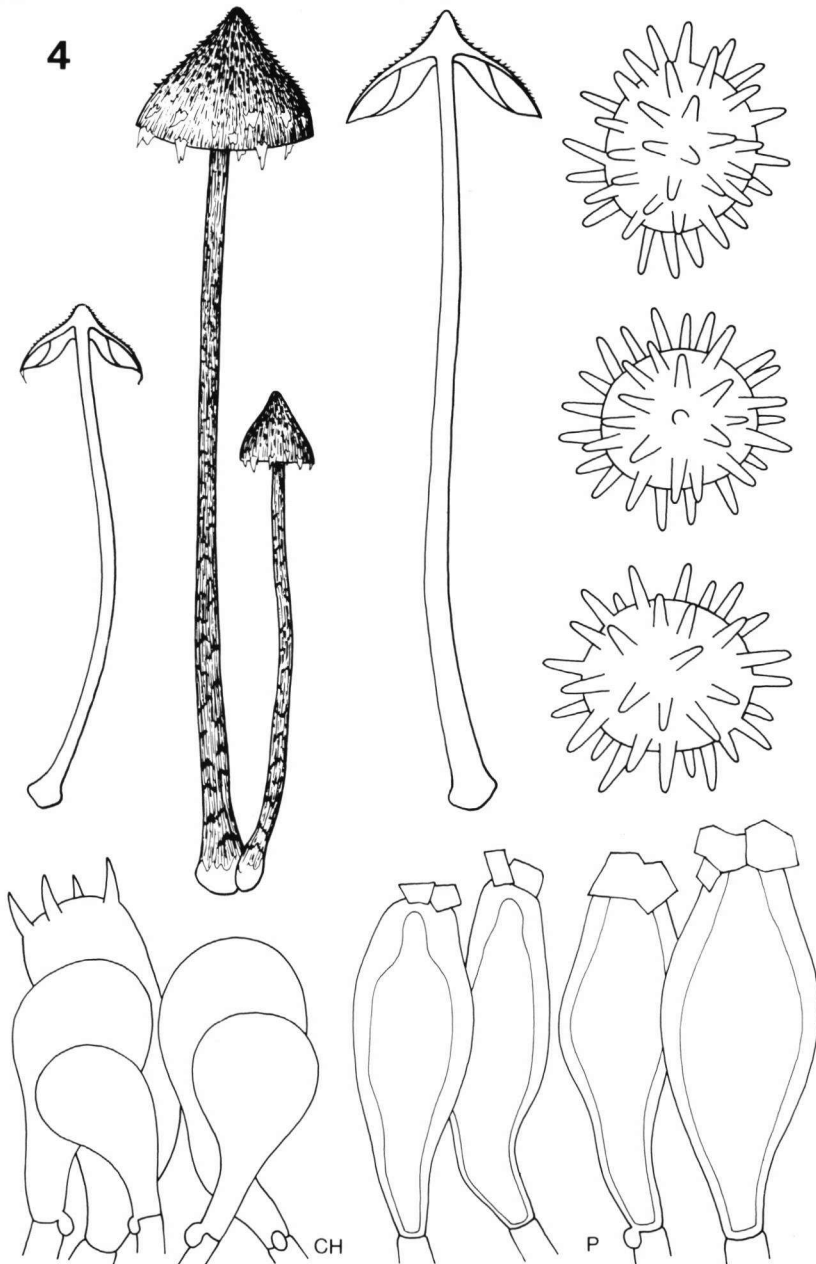


Fig. 4: *A. gemina* Horak (type): carpophores, spores, basidium and cheilocystidia (CH), pleurocystidia (P).

tals, occasionally intermixed with clavate, thin-walled cystidia ($-45 \times -20 \mu\text{m}$). Cuticle a cutis or trichoderm of cylindric hyphae ($6-10 \mu\text{m}$ diam.), with yellowish (KOH) encrusting and vacuolar pigment. Clamp connections present.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis* (Fagaceae). Papua New Guinea, Sabah (Borneo).

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Watut, 28.IV.1972, Horak (ZT 72/425, holotype); Bulolo, Manki, 28.III.1973, Horak (ZT 73/116); Central Highlands: Mt. Hagen, Baiyer River, 22.V.1972, Horak (ZT 72/477). — SABAH (BORNEO): Mt. Kinabalu, 1800 m, 18.I.1964, Corner (RSNB 5007, ZT 78/45).

Microscopically this species is extremely similar to *A. petchii* (Boed.) Horak but the white appendiculate veil remnants along the margin of the pileus and the girdles of veil on the non-pruinose stipe distinguish well the two taxa from each other.

5. *Astrosporina echinosimilis* Horak, *spec. nov.*—Fig. 5

Pileo 30 mm, conico-convexo, papillato-expando vel campanulato, argillaceo, dense squamis subsquarrosis concoloribus oblecto. Lamellis adnatis, ex albido argillaceis. Stipite 75 × 4 mm, cylindraceo, pileo concolori, fibrillis vel squamulis albis argillaceisve in toto oblecto. Odore grato. Sporidia 7,5–10 μm , subglobose vel ovoideis, spinis conicis ($-3 \mu\text{m}$ altis) instructis, brunneis. Cheilocystidiis clavatis, tenuitunicatis. Pleurocystidiis metuloidis, incrustatis. Ad terram in silvis fagineis. Nova Guinea. Typus: ZT 71/200.

Pileus 10–30 mm diam., conico-convex, papillate-expanded or campanulate, beige or pale brown, densely covered with small squarrose concolorous scales and squamules, fibrillose-rimose towards margin, covered with white fibrils of cortina when young, dry. Lamellae adnate to adnexed, ventricose, crowded (L 14–20, 3–5), pallid, yellowish or beige turning argillaceous, edge albobimbricate. Stipe 30–75 × 1,5–4 mm, cylindric, base slightly swollen but not bulbous, whitish to pale brown, all over covered with concolorous fibrillose or minutely squamules, pruinose at apex, dry, solid becoming hollow, single or fasciculate. Context whitish. Odour fruity. Spore print brown.

Spores 7,5–10 μm , subglobose to ovoid, covered with conical apically obtuse spines (up to 3 μm long), brown. Basidia 35–50 × 9–11 μm , 4-spored. Cheilocystidia 20–45 × 12–22 μm , clavate or ovoid, thin-walled, hyaline, forming sterile gill edge. Pleurocystidia 30–50 × 8–20 μm , fusoid to lageniform, metuloid (membranes $-2 \mu\text{m}$ diam.), yellowish (KOH), encrusted with crystals. Caulocystidia like pleurocystidia. Cuticle a trichoderm of cylindric hyphae (4–8 μm diam.), encrusted with yellow-brown (KOH) pigment. Clamp connections present.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis* (Fagaceae). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 22.X.1971, Horak (ZT 71/200, holotype); Bulolo, Manki, 17.XII.1971, Horak (ZT 71/430); Bulolo, Manki, 2.V.1972, Horak (ZT 72/433).

6. *Astrosporina pahangi* Corner & Horak, *spec. nov.*—Fig. 6

Pileo 25 mm, subumbonato dein plano, fusco, squamis fibrillosis subsquarrosis oblecto. Lamellis adnatis, ochraceis. Stipite 30 × 2 mm, cylindrico, ad basim subclavato, flavido, pruinoso, velo nullo.

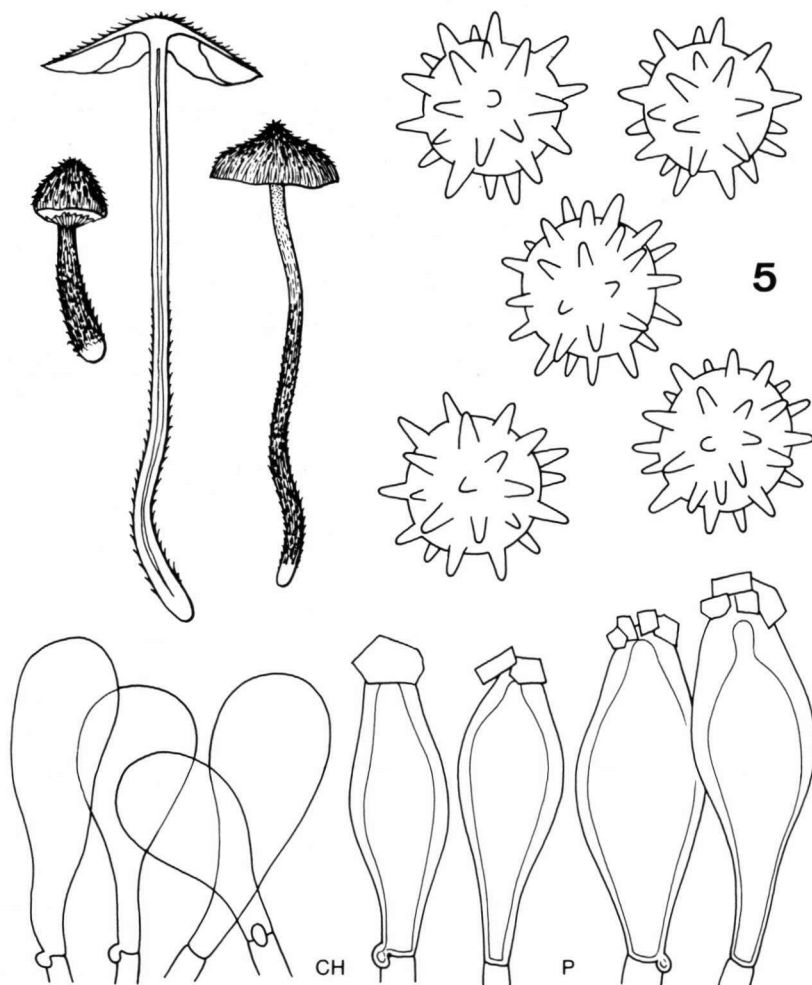


Fig. 5: *A. echinosimilis* Horak (type): carpophores, spores, cheilocystidia (CH), pleurocystidia (P).

Sporis $10-12 \times 8-11 \mu\text{m}$, conico-gibbosis, brunneis. Cystidiis lageniformibus, crasse tunicatis, haud cristalliferis. Epicute ex hyphis fibuligeris cylindraceutis formantibus, incrustatis. Ad terram in silvis. Malaya. Typus: ZT 78/46.

Pileus $\sim 25 \text{ mm}$ diam., umbonate becoming plane, fuscous turning fawn in aged carpophores, densely covered with numerous small pyramidal and over the disc recurved squamules, dry, veil remnants absent. Lamellae adnexed, crowded, fawn to pale ochraceous, edge concolorous. Stipe $15-30 \times 1-3 \text{ mm}$, cylindric, base slightly swollen ($\sim 4 \text{ mm}$ diam.), fawn, minutely pruinose all over, cortina absent, solid, dry, single in groups. Context concolorous or paler as pileus, whitish at apex of stipe. Odour not distinctive.

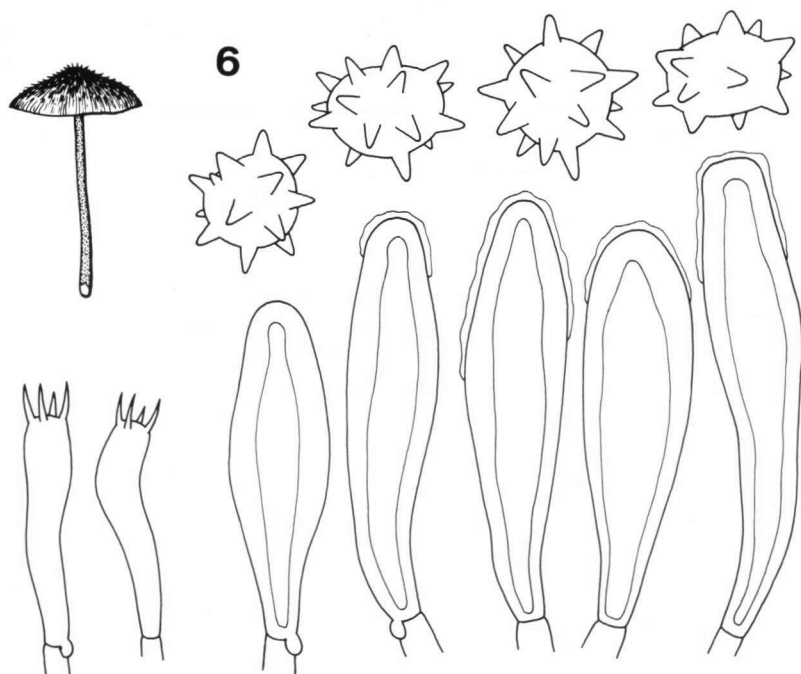


Fig. 6: *A. pahangi* Corner & Horak (type): carpophore, spores, basidia, cheilo- and pleurocystidia.

Spores $10\text{--}12 \times 8\text{--}11\ \mu\text{m}$, covered with conspicuous conic projections, yellow-brown. Basidia $25\text{--}30 \times 5\text{--}6\ \mu\text{m}$, 4-spored. Cheilocystidia $45\text{--}70 \times 12\text{--}16\ \mu\text{m}$, lageniform, thick-walled, membrane yellow in KOH, apex encrusted with resinous cap, crystals absent. Pleurocystidia like cheilocystidia, often hyaline, rather scattered. Cuticle a cutis of cylindric repent hyphae ($5\text{--}10\ \mu\text{m}$ diam.), bundled and semi-erect in squamules, with yellow-brown encrusting and plasmatic pigment. Clamp connections numerous.

HABITAT.—On sandy mossy soil in forest. Malaysia.

MATERIAL.—MALAYSIA: Pahang, Cameron Highlands, 1600 m, 27.VII.1934, *Corner* (ZT 78/46, holotype).

The following characters are distinctive for *A. pahangi*: Small yellow-brown carpophores, scaly pileus, stellate spores, and fusoid metuloid cystidia with yellow (KOH) membrane and lacking crystals.

7. *Astrosporina hydrocybiformis* Corner & Horak, *spec. nov.*—Fig. 7

Pileo $\sim 25\ \text{mm}$, acuto-conico dein papillato-plano, melleo vel fusco, senectudine pallidiori, striato-sulcato, glabro. Lamellis adnexo-adnatis, melleo-cinnamomeis, albofimbriatis. Stipite $\sim 45 \times \sim 1.5\ \text{mm}$, cylindrico, pileo concolori vel pallidiori, fibrillis albis vel roseis e velo instructo, cortina fibrillosa subpersistente ornato.

Sporis $10-12,5 \times 8,5-11 \mu\text{m}$, conico-gibbosis. Cheilocystidiis cylindraceis vel sublageniformibus, tenuitunicatis, haud cristalliferis. Epicute ex hyphis cylindraceis cutem formantibus, incrustatis, fibulatis. Ad terram in silvis. Singapore. Typus: ZT 78/47.

Pileus $10-25 \text{ mm}$ diam., conico-convex with acute prominent umbo, in aged carpophores centre around papilla depressed and margin often upturned, ochraceous, yellow-brown or fuscous, becoming paler with age, hygrophanous, smooth or sprinkled with minute concolorous or pinkish fibrils (from the veil), sulcate to striate near margin, membranaceous, dry. Lamellae adnate to adnexed, ventricose, crowded (L $6-12$, -3), argillaceous turning pale fuscous or cinnamon, edge white to pinkish, fimbriate. Stipe $15-45 \times 1-1,5 \text{ mm}$, cylindric, slender, concolorous with pileus or paler, base white, covered with pale yellow or pinkish fibrils, occasionally with distinct cortina-like girdle, apex pruinose, dry, hollow, single in groups. Context pale brown. Odour and taste not distinctive.

Spores $10-12,5 \times 8,5-11 \mu\text{m}$, subglobose to ovate, with conspicuous conic, rarely saddle-shaped projections, spines up to $2,5 \mu\text{m}$ long, yellow-brown. Basidia $25-30 \times 5-6 \mu\text{m}$, 4-spored. Cheilocystidia $30-55 \times 6-15 \mu\text{m}$, cylindric or sublageniform, thin-walled, with yellow-brown plasmatic pigment, forming sterile gill edge. Caulocystidia like cheilocystidia, crystals absent.

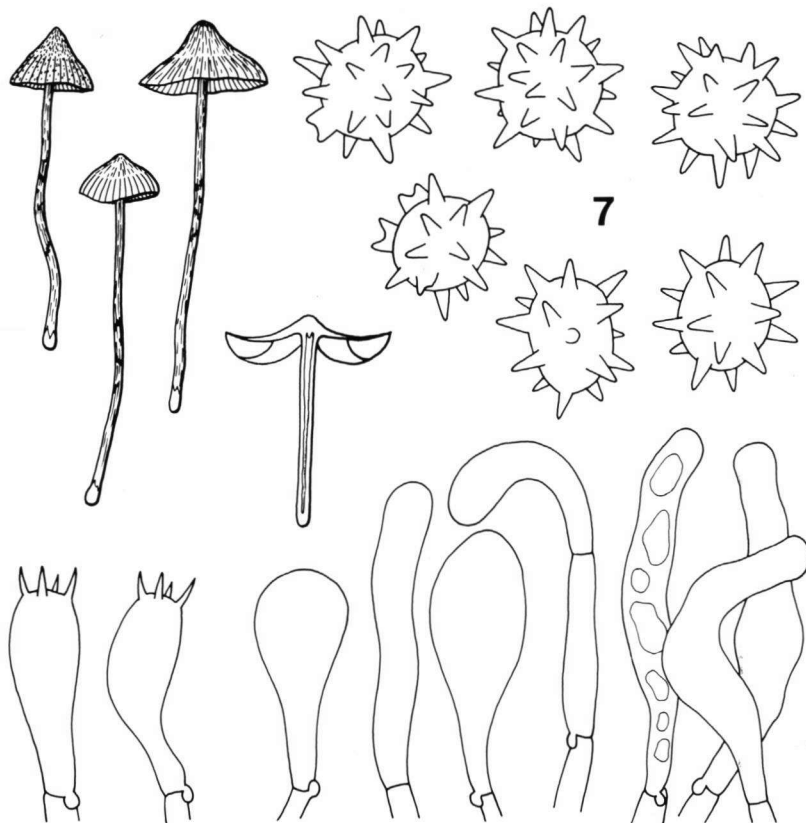


Fig. 7: *A. hydrocymbiformis* Corner & Horak (type): carpophores, spores, basidia, cheilocystidia.

Pleurocystidia absent. Cuticle a cutis of cylindric hyphae (5–12 μm diam.), with yellow-brown plasmatic and encrusting pigment. Clamp connections present.

HABITAT.—On soil in forests. Singapore, Malaysia.

MATERIAL.—**SINGAPORE:** Botanical Gardens, 5.IX.1940, *Corner* (ZT 78/47, holotype).
— **MALAYSIA:** Johore, Gunong Panti, 4.IV.1931, *Corner* (ZT 78/78); Johore, Mawai, Dohol River, 12.VII.1931, *Corner* (ZT 78/49).

Owing to the habit, the colour and the veil remnants on the stipe this species resembles very much *Cortinarius* (i.e. *C. acutus*). Spores and cystidia, however, are those of a typical *Astrosporina* sect. *Calosporae*.

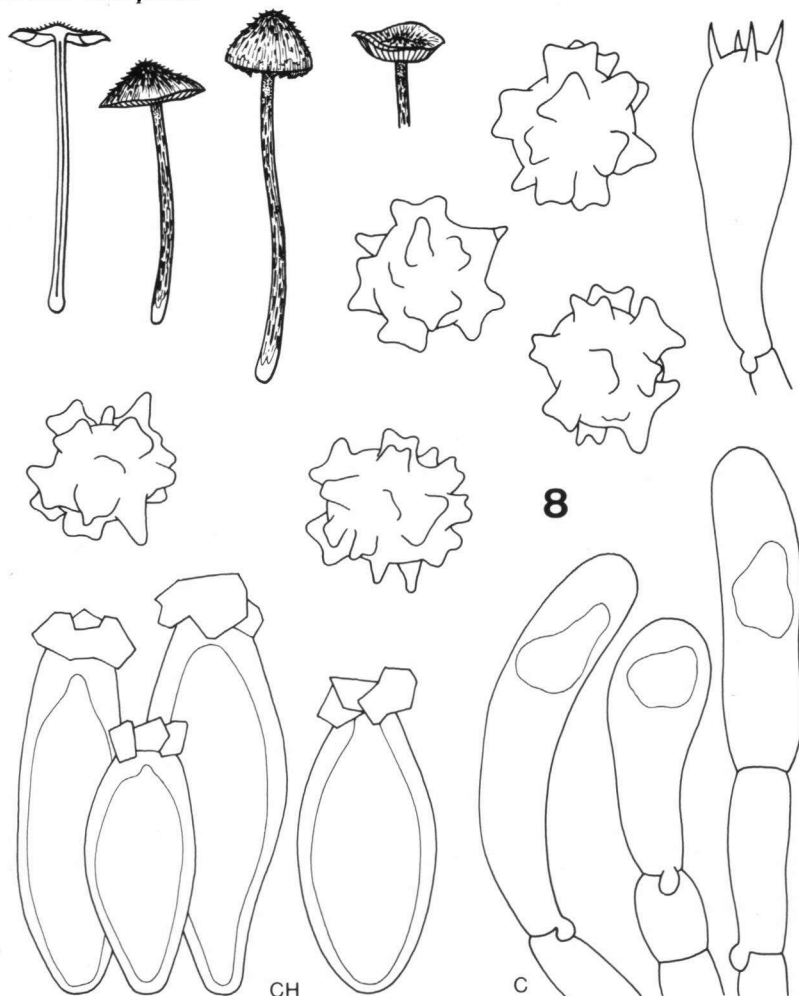


Fig. 8: *A. lasserooides* Horak (type): carpophores, spores, basidium, cheilo- and pleurocystidia (CH), caulocystidia (C).

8. *Astrosporina lasseroides* Horak, *spec. nov.*—Fig. 8

Pileo -15 mm, conico convexo subcampanulato, obscure avellaneo, squamis squarrosis concoloribus oblecto. Lamellis adnatis, albidis dein argillaceis. Stipite -50 × -2 mm, cylindraceo, subbulboso, pileo concolori, fibrillis albis ochrascentibus dense instructo. Odore nullo. Sporis 10,5–13 µm, subglobosis, cretis irregularibus instructis (*A. lasser* simile), brunneis. Cystidiis fusoides metuloidisque, incrustatis. Ad terram in silvis Lithocarpi. Nova Guinea. Typus: ZT, 72/422.

Pileus 10–15 mm diam., conico-convex or campanulate, becoming umbonate-expanded, brown (hazel-nut brown), radially fibrillose, disc densely covered with appressed or subsquarrose concolorous scales and squamules, margin estriate, covered with white fibrillose or submembranous remnants of veil in young carpophores, dry. Lamellae adnexed to adnate, ventricose, crowded (L 10–16, -3), whitish turning argillaceous, edge even, concolorous. Stipe 30–50 × 1,5–2 mm, cylindric, slightly swollen at base, concolorous with pileus or of paler colour, whitish at base, densely covered with white or pale ochraceous fibrils of veil, distinct belt of cortina absent, dry, solid becoming hollow, single in groups. Context brownish. Odour none. Spore print brown.

Spores 10,5–13 µm, subglobose to ovoid, covered with conic, crestlike, forked or saddle-shaped projections (up to 2,5 µm high), brown. Basidia 30–44 × 12–15 µm, 4-spored. Cheilo- and pleurocystidia 35–55 × 12–20 µm, ovoid-fusoid, metuloid (membranes -3 µm diam.), hyaline or yellowish (KOH), encrusted with crystals. Caulocystidia cylindric, thin-walled, often with strong refractive inclusions. Cuticle a cutis or trichoderm of cylindric hyphae (6–10 µm diam.), encrusted with brown (KOH) pigment. Clamp connections numerous.

HABITAT.—On soil under *Castanopsis* and *Lithocarpus* (Fagaceae). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Watut, 28.IV.1972, Horak (ZT 72/422, holotype).

In the field this fungus may be mistaken for *A. echinosimilis* Horak. Both taxa grow in similar ecologic conditions under *Castanopsis* and *Lithocarpus*. The crested spores remind of those found on *A. lasser* (Dennis) described from Venezuela.

9. *Astrosporina alienospora* Corner & Horak, *spec. nov.*—Fig. 9

Pileo -14 mm, conico dein subumbonato-plano, argillaceo-stramineo, fibrilloso vel subsquamuloso. Lamellis adnexis, albidis senectudine argillaceis vel cinnamomeis. Stipite -20 × -1,5 mm, cylindrico, pileo concolori, fibrilloso, haud pruinoso. Sporis 8–10,5 × 7–8,5 µm, noduloso-angulatis, cretis furcatis saepe instructis, brunneo-luteis. Cheilocystidiis clavato-cylindraceis, tenuitunicatis, hyalinis, pigmento luteo-brunneo impletis, haud cristalliferis. Ad terram in silvis. Singapore. Typus: ZT 78/50.

Pileus -14 mm diam., conic, becoming plane or even slightly concave, centre often subumbonate, dingy fawn when young, turning pale fuscous, covered with minute fibrillose squamules and scales (recurved at centre), faintly striate-sulcate towards the subrimose margin, veil remnants absent, dry. Lamellae adnexed, subdistant, pallid white when young, turning pale cinnamon, edge white, fimbriate. Stipe 10–20 × 1–1,5 mm, cylindric, equal, slender, fawn later turning pale fuscous, fibrillose-villous when young, fibrillose in mature specimens, cortina absent, dry, single in groups. Context concolorous with pileus. Odour faint, waxy.

Spores 8–10,5 × 7–8,5 µm, nodulose-angular, often with saddle-shaped or flange-like warts and projections, occasionally intermixed with conic broad spines, yellow-brown. Basidia 27–34

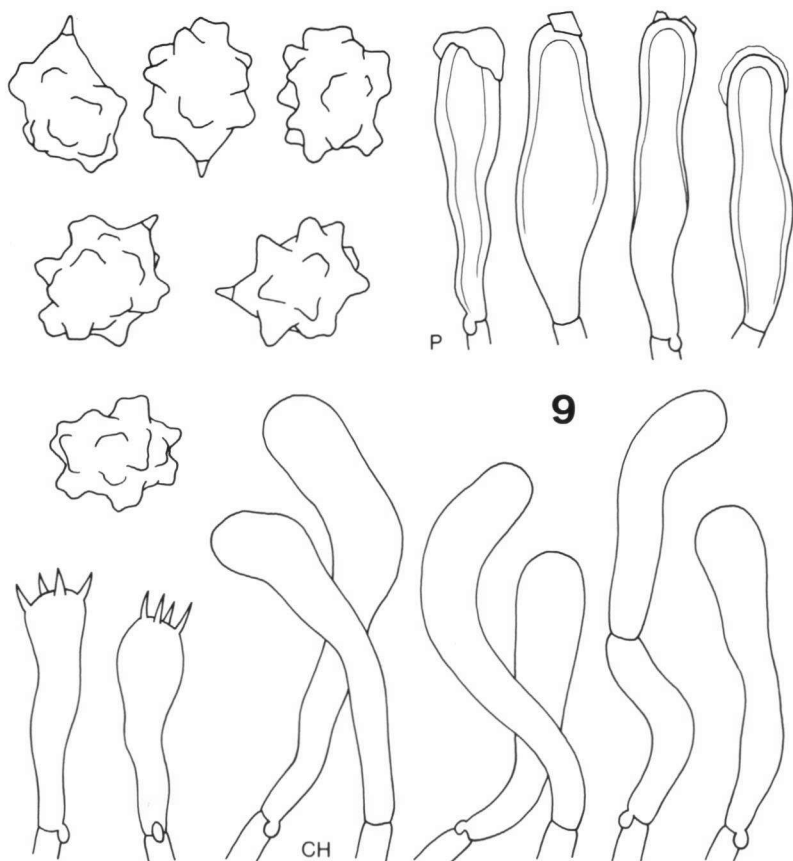


Fig. 9: *A. alienospora* Corner & Horak (type): spores, basidia, cheilocystidia (CH), pleurocystidia (P).

$\times 7-10 \mu\text{m}$, 4-spored. Cheilocystidia $30-65 \times 6-11 \mu\text{m}$, cylindric to subclavate, often curved, thin-walled, with yellow-brown plasmatic pigment (frequently clumped in plasma), crystals absent. Pleurocystidia $35-50(-75) \times 8-14 \mu\text{m}$, subclavate to lageniform, thick-walled at apex, hyaline, with resinous incrustation, scattered. Cuticle a cutis of repent cylindric hyphae ($6-10 \mu\text{m}$ diam.), membranes encrusted with brownish pigment. Clamp connections present.

HABITAT.—On bare soil. Singapore.

MATERIAL.—SINGAPORE: Botanical Gardens, 4.IX.1937, *Corner* (ZT 78/50, holotype); Botanical Gardens, 7.XI.1934, *Corner* (ZT 78/51).

This species is characterized by the clavate-cylindric cheilocystidia and the shape of the spores. The spore-ornamentation is intermediate between the simple-gibbous and the crested-bifurcate type of projections.

IV. Sect. CORTINATAE Kühner & Boursier 1932

10. *Astrosporina squarrosolutea* Corner & Horak, *spec. nov.*—Fig. 10

Pileo –70 mm, umbonato vel convexo, luteo, squamis recurvatis conspicuisque concoloribus vel aurantiacis oblecto. Lamellis adnatis vel adnato-decurrentibus, luteis dein pallide fuscis. Stipite –75 × –8 mm, cylindrico vel attenuato apicem versus, submarginato, luteo, fibrilloso, zonis fibrillosis aurantiacisque e velo ornato. Sporis 8–10 × 5–6 μ m, nodulosis. Cystidiis fusoidis, interdum incrustatis. Ad terram in silvis. Malaya. Typus: ZT 78/52.

Pileus 30–70 mm, convex or plane with umbonate centre; bright yellow, becoming pale brown over the disc; centre covered with stout, erect, conic, fibrillose scales (up to 4 mm high, 1–2 mm wide), coarsely fibrillose towards the strongly inrolled margin; dry, veil remnants consisting of orange fibrils. Lamellae adnate to adnato-decurrent, often subsinuate, crowded (L–25, –3); light yellow turning to pale yellow-fuscous, edge concolorous, even. Stipe 40–75 × 3,5–8 mm, cylindric or attenuated towards apex, stout, submarginate base up to 16 mm wide; yellow; apex pruinose, towards base covered with conspicuous, orange, appressed, floccose-fibrillose girdles of the veil, distinct cortina absent; dry, solid, single in groups. Context pale yellow in stipe, orange beneath cuticle. Odour strong, not spermatie.

Spores 8–10 × 5–6 μ m, nodulose, knobs hemispheric to subconic, yellow-brown. Basidia 18–26 × 5–7 μ m, 4-spored. Cheilo- and pleurocystidia 30–60 × 14–25 μ m, broadly fusoid to lageniform, metuloid, hyaline, rarely with small crystals or resinous incrustation. Caulocystidia not distinctive. Cuticle a cutis or trichoderm of cylindric hyphae (4–10 μ m diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in forest under oak. Malaysia.

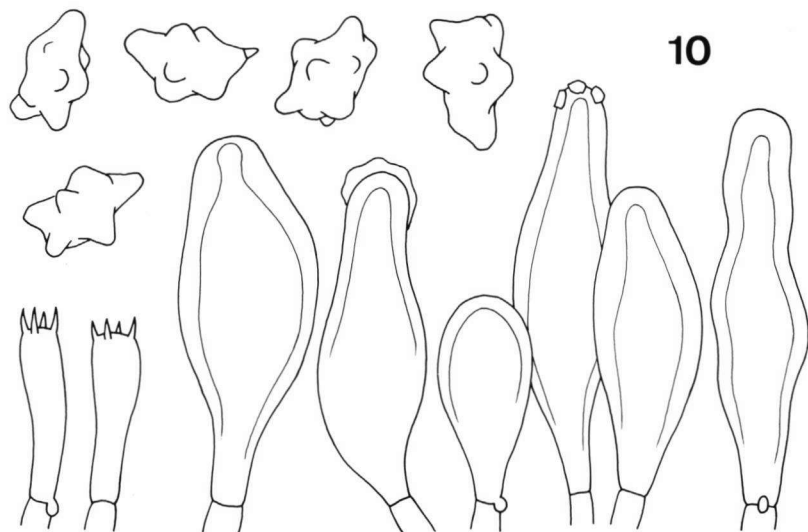


Fig. 10: *A. squarrosolutea* Corner & Horak (type): spores, basidia, cheilo- and pleurocystidia.

MATERIAL.—MALAYSIA: Pahang, Cameron Highlands, 1500 m, 31.VII.1934, *Corner* (ZT 78/52, holotype).

This yellow species is well characterized by its large size, the scaly pileus and the orange fibrillose veil remnants on the stipe. *A. squarrosolutea* is a close relative of *A. lutea* (Kobay. & Hongo, 1952) whose spores, however, are distinctly smaller.

11. *Astrosporina luteifolia* Horak, *spec. nov.*—Fig. 11

Pileo —30 mm, convexo-campanulato, luteo squamis brunneis squarrosis oblecto, sicco. Lamellis adnatis, luteis dein ochraceis. Stipite —45 × 5 mm, cylindraceo, luteo, squamis brunneis e velo cingulato, sicco. Caro lutea. Odore ingrato. Sporis 7,5–10 × 5,5–7,5 μ m, nodulosi. Cystidiis lageniformibus, incrustatis, ad apicem metuloideis, luteolis. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 73/218.

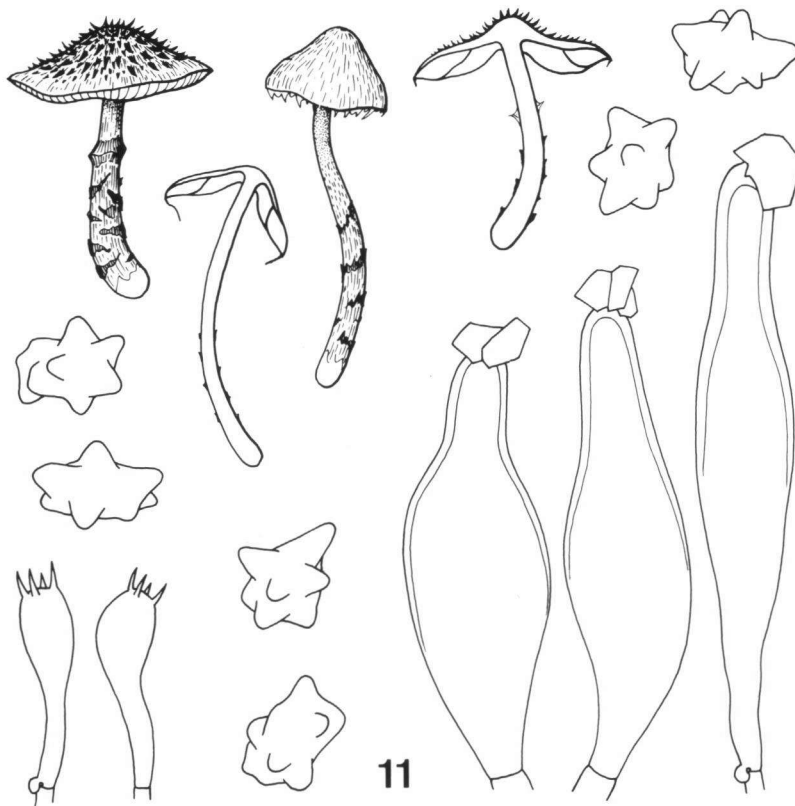


Fig. 11: *A. luteifolia* Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia.

Pileus -30 mm diam., hemispheric when young, becoming convex or campanulate; yellowish, covered with light brown or dark brown fibrills or (in old carpophores) squarrose scales especially at the umbo, fibrillose-rimose towards the margin, with yellow-brown patches and squamules from the veil, dry. Lamellae adnate to adnexed, ventricose, crowded; deep yellow turning ochraceous or yellow-beige, with white fimbriate edges. Stipe 20-45 × 3-5 mm, cylindric, equal or slightly attenuated above; yellow, towards the base covered with several incomplete yellow-brown zones or girdles from the veil; dry, apically inconspicuously pruinose, solid, single in groups. Context yellow (in pileus and stipe!). Odour unpleasant, fishy.

Spores 7.5-10 × 5.5-7.5 μ m, nodulose, knobs conspicuous, brown. Basidia 25-30 × 8-9 μ m, 4-spored. Cheilo- and pleurocystidia 55-85 × 10-20 μ m, cylindric to slender fusoid, hyaline to yellowish, thick-walled near the encrusted apex. Caulocystidia none. Cuticle a cutis consisting of cylindric hyphae (5-10 μ m diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests (*N. carrii*, *N. grandis*). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Wau, Mt. Kaindi, 2400 m, 11.V.1973, Horak (ZT 73/218, holotype).

This striking species is found under *Nothofagus* spp. in temperate montane forests in Papua New Guinea (above 2000 m a.s.l.). Due to the yellow lamellae and the brown appressed zones of veil on the yellow stipe *A. luteifolia* is readily recognized in the field.

12. *Astrosporina cingulatipes* Corner & Horak, *spec. nov.*—Fig. 12

Pileo -20 mm, convexo, umbonato-gibboso, umbrino, minute squarroso. Lamellis adnatis, umbrinis, albofimbriatis. Stipite -40 × -2 mm, cylindrico, pileo concolori, zonis albis subperonatis e velo instructo. Sporis 7-8,5 × 5,5-6,5 μ m, nodulosi. Cystidiis vesiculososubfusoides, tenuitunicatis, haud incrustatis. Ad terram in silvis. Singapore. Typus: ZT 78/53.

Pileus 10-20 mm diam., conic becoming convex or plane with umbonate or gibbous centre; brown to umber, disc darker, paler towards the striate-sulcate margin; centre covered with squarrose, small, recurved scales, appressedly fibrillose towards margin, dry, fibrillose veil remnants present in young specimens. Lamellae adnexed, subventricose, rather crowded (L -20, -3); concolorous with pileus, edge albofimbriate. Stipe 30-40 × 1,5-2 mm, cylindric, equal, slender; concolorous with pileus or bay-rufous, covered with several white fibrillose or subperonate belts of the veil, apex subpruinose; dry, hollow, single in groups. Context brown. Odour not distinctive.

Spores 7-8,5 × 5,5-6,5 μ m, nodulose, knobs hemispheric to subconic, yellow-brown. Basidia 20-25 × 6-7 μ m, 4-spored. Cheilocystidia 30-40 × 14-20 μ m, vesiculose or subfusoid, thin-walled, hyaline, occasionally with yellow-brown (KOH) inclusion, crystals none. Pleuro- and caulocystidia absent. Cuticle a cutis or trichoderm of bundled cylindric hyphae (5-10 μ m diam.), encrusted with brown pigment. Clamp connections present.

HABITAT.—On soil in forest. Singapore.

MATERIAL.—SINGAPORE: Botanic Garden, Garden's Jungle, 15.III.1943, Corner (ZT 78/53, holotype).

A. cingulatipes is close to *A. lanuginosa* (Fr.) Schroeter and its related species. The Malayan fungus is separated from its European relatives by the white fibrillose veil which remains as distinct (and often peronate) belts on the stipe.

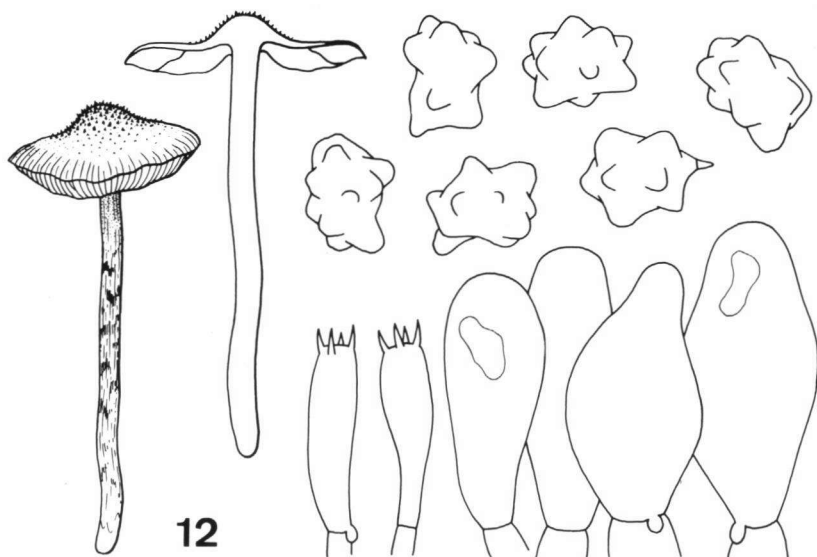


Fig. 12: *A. cingulatis* Corner & Horak (type): carpophores, spores, basidia, cheilocystidia.

13. *Astrosporina punctatosquamosa* Horak, *spec. nov.*—Fig. 13

Pileo –20 mm, convexo campanulato, ochraceobrunneo, squamis minutis brunneis oblecto, marginem versus fibrilloso. Lamellis adnatis vel emarginatis, argillaceis. Stipite –45 × –2 mm, cylindraco, brunneo, ad apicem fibrillis albis appressis e velo, basim versus fibrillis brunneolis cingulato, sicco. Odore *Pelargonii* in mentem revocante. Sporibus 6–8 × 5,5–7 μm, nodulosis. Cystidiis dimorphis, pleurocystidiis fusoidis, metuloidis, incructis. Ad terram in silvis quercuum. Nova Guinea. Typus: ZT 72/445.

Pileus –20 mm diam., hemispheric when young becoming umbonate-convex or campanulate; ochraceous-brown to brown, densely covered with compact wart-like dark brown squamules especially at the disc, fibrillose towards the obscurely striate margin, margin attached with white fibrillose veil remnants in young specimens, dry. Lamellae adnate or emarginate, ventricose, crowded (L 14–20, –5); whitish to beige, turning brownish (with ochraceous tints), albobimbricate edges. Stipe 30–45 × –2 mm, cylindric, equal, slender; beige to brownish, at apex densely covered with white fibrils from cortina, towards the base with several brownish incomplete girdles from veil; dry, hollow, single in groups. Context brownish. Odour strong, pleasant (like squashed leaves of *Pelargonium*).

Sporibus 6–8 × 5,5–7 μm, ovoid in profile, numerous hemispheric knobs, brown. Basidia 22–32 × 8–9 μm, 4-spored. Cheilocystidia 20–30 × 10–16 μm, clavate to vesiculose, thin-walled, not encrusted. Pleurocystidia 40–65 × 15–25 μm, fusoid, metuloid, encrusted, hyaline to yellowish (in KOH). Cuticle a trichoderm of bundled cylindric short cells (6–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 5.V.1972, Horak (ZT 72/445, holotype); Bulolo, Manki, 9.IV.1973, Horak (ZT 73/155); Bulolo, Manki, 30.XI.1972, Horak (ZT 72/675).

This well-defined species of *Astrosporina* is common on soil in the *Castanopsis-Lithocarpus*-forests of Papua New Guinea. The minute punctate squamules on the pileus, the strong odour of *Pelargonium* and the specific spores distinguish this taxon from other members of *Astrosporina*.

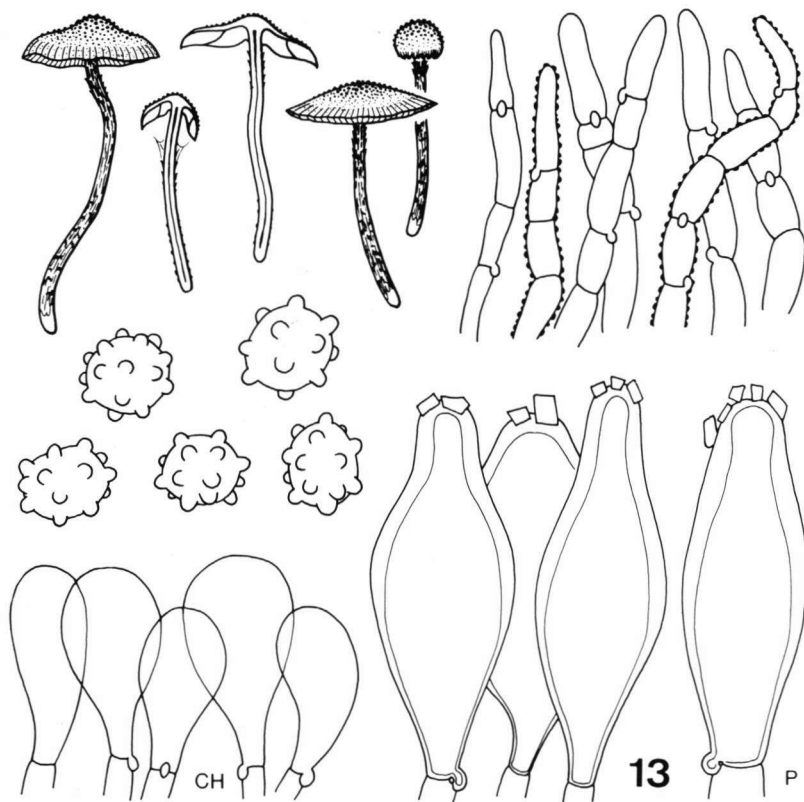


Fig. 13: *A. punctatosquamosa* Horak (type): carpophores, spores, cheilocystidia (CH), pleurocystidia (P), cuticle.

14. *Astrosporina incognita* Horak, *spec. nov.*—Fig. 14

Pileo –20 mm, e conico-convexo campanulato, aetate unbonato-plano, dilute brunneo vel brunneo, ad marginem velo albo instructo, squamis minutis brunneis oblecto. Lamellis emarginato-adnexis, ex albido-argillaceis. Stipite –35 × –3 mm, cylindraco, pileo concolori, fibrillis albis e velo dense oblecto, sicco. Odore grato. Sporis 6–9 × 5–7,5 μm, nodulosi. Cheilocystidiis clavatis vel vesiculosi, crassetunicatis, haud in crustatis. Pleurocystidiis fusoides, metuloideis, in crustatis. Caulocystidiis praesentibus. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 72/472.

Pileus –20 mm diam., convex when young, soon becoming conic and later campanulate, knob-like papilla always conspicuous; light brown, hazel brown, dark brown; centre densely

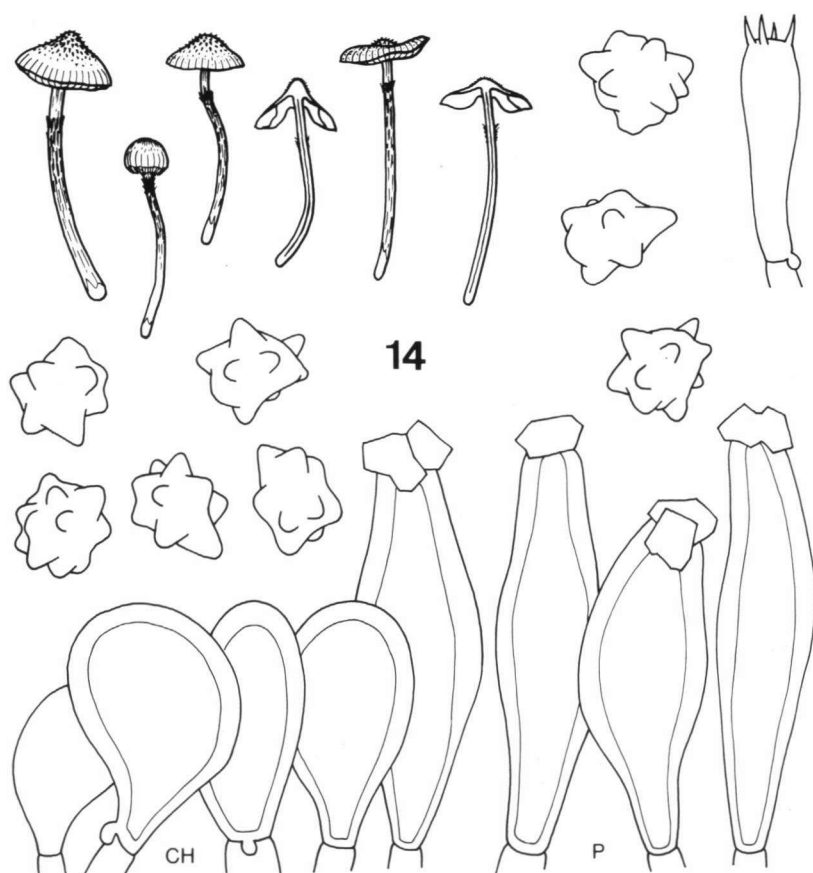


Fig. 14: *A. incognita* Horak (type): carpophores, spores, basidium, cheilocystidia (CH), pleurocystidia (P).

covered with concolorous squamules or minute scales, fibrillose towards the margin with (in young carpophores) white fibrils from the veil; striate or not, dry, occasionally hygrophanous. Lamellae emarginate-adnexed, ventricose, crowded (L 8–22, –3); whitish, beige turning argillaceous, with white, fimbriate edges. Stipe 20–35 × 2 mm, cylindric, equal, rarely base swollen; concolorous with pileus or paler, densely covered with white or brownish coarse fibrils or squamules from the veil, occasionally with distinct fibrillose belt from cortina; dry, fragile, hollow, single or in clusters. Context light brown. Odour pleasant, like fruit or flowers of *Pirola*, especially in young specimens.

Spores 6–9 × 5–7.5 μm, nodulose, brown. Basidia 22–30 × 6–9 μm, 4-spored. Cheilocystidia 20–45 × 10–24 μm, clavate to vesiculose, thick-walled, not encrusted. Pleurocystidia 40–65 × 13–18 μm, fusoid, metuloid, encrusted, hyaline to yellowish. Caulocystidia inconspicuous, cylindric or clavate-fusoid, thin-walled, rarely encrusted. Cuticle a cutis or trichoderm of short cylindric hyphae (5–15 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests, rarely also under *Castanopsis*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Western Highlands, Mt. Hagen, Kuna, 20.V.1972, Horak (ZT 72/472, holotype); Eastern Highlands, Mt. Michael, Frigano, Okapa track, 4.XII.1971, Horak (ZT 71/357); Eastern Highlands, Mt. Michael, Frigano, Hut track, 31.XII.1971, Horak (ZT 71/475); Morobe district, Wau, Mt. Kaindi, 2400 m, 28.XII.1971, Horak (ZT 71/460); Eastern Highlands, Goroka, Mt. Otto, 13.I.1972, Horak (ZT 72/72); Morobe district, Wau, Mt. Kaindi, 5.X.1972, Horak (ZT 72/587).

In the *Nothofagus* forests of Papua New Guinea *A. incognita* represents the most common member of *Astrosporina*. Although a variable fungus, the scaly pileus and the particular smell distinguish this rather small and brown coloured species from others also found in the same biotop.

15. *Astrosporina paracerasphora* Horak—Fig. 15

Astrosporina paracerasphora Horak in N. Zealand J. Bot. 15: 731. 1977.

Description of the collection from Sabah (Borneo):

Pileus 10–30 mm diam., umbonate, becoming plane; sepia brown turning paler with age, with whitish fibrils along the margin; densely squarrose-squamulose, rimose towards the margin, dry.

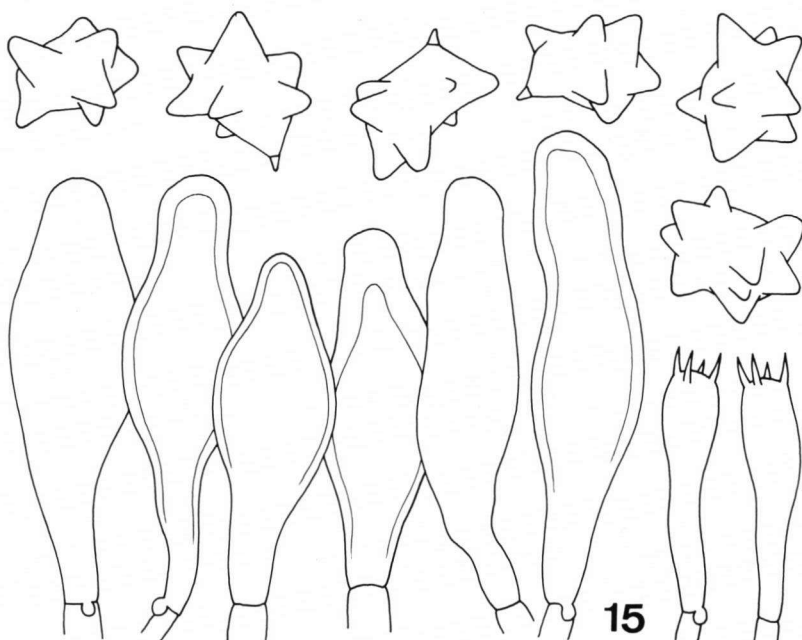


Fig. 15: *A. paracerasphora* Horak (ZT 78/54): spores, basidia, cheilo- and pleurocystidia.

Lamellae adnexed, crowded (L 12–18, –3); pale argillaceous becoming pallid fawn, edge albo-fimbriate. Stipe 20–30 × 2–5 mm, subcylindric; pale brown, covered with white cottony fibrils, dry. Context brown. Odour not distinctive.

Spores 9–11 × 7.5–8.5 μ m, nodulose to substellate, conic knobs well pronounced, yellow-brown. Basidia 30–36 × 10 μ m, 4-spored. Cheilo- and pleurocystidia 40–70 × 12–16 μ m, fusoid to langeniform, thin-walled or metuloid (at least towards apex), hyaline, crystals absent or scattered. Caulocystidia 40–100 × 6–13 μ m, cylindric to subfusoid, thin-walled (1–2 μ m diam.), with brown (KOH) membranous pigment. Clamp connections present.

HABITAT.—On rotten wood. Sabah; New Zealand (type).

MATERIAL.—NEW ZEALAND: Westcoast, Lake Haupiri, Kopara, 8.XII.1967, Horak (PDD 27108, holotype). —SABAH (BORNEO): Mt. Kinabalu, Bembangan River, –1800 m, 25.II.1964, Corner (RSNB 5457 B, ZT 78/54).

Astrosporina paracerasphora Horak was originally described from New Zealand where this fungus grows on rotten wood of *Nothofagus* (Fagaceae). This species is closely related to the European *A. lanuginosa* (Fr.) Schroeter and *A. cerasphora* (Singer) from Argentina and Chile. Both fungi also are reported to inhabit rotten moss-covered stumps and logs.

16. *Astrosporina neoumbrina* (Y. Kobay.) Horak, *comb. nov.*—Fig. 16

Inocybe neoumbrina Y. Kobay. in Nagaoa 2: 106. 1952 (basionym)

Description of the material from Papua New Guinea:

Pileus –20 mm diam., hemispheric when young soon conico-convex or umbonate to campanulate; pale brown to dark brown, often with distinct reddish or olive tint at centre, paler towards estriate margin; smooth at disc, fibrillose or rimose (occasionally also split) at margin; dry, subviscid when moist, fibrillose veil remnants absent. Lamellae adnexed to emarginate-adnate, ventricose, crowded (L –20, –3); whitish soon turning argillaceous or pale brown, edge albofimbriate. Stipe –30 × –2 mm, cylindric, base slightly swollen or bulbous (up to 3.5 mm diam.) but not marginate; pale yellow to brownish, darker towards base, densely covered with white or concolorous fibrils especially above base, apex pruinose; dry, cortina absent, solid, single in groups. Context pale brown. Odour not distinctive.

Spores 6–7.5 × 4.5–6 μ m, angular to subnodulose, knobs often inconspicuous, yellow-brown. Basidia 20–28 × 6–8 μ m, 4-spored. Cheilo- and pleurocystidia 40–60 × 10–18 μ m, fusoid, thin-walled on edge of lamella, metuloid at apex in pleurocystidia, crystals small and rare, usually absent. Distinctive caulocystidia absent. Cuticle a cutis of cylindric, slightly gelatinized hyphae (2–10 μ m diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in forest (under *Nothofagus*, *Castanopsis-Lithocarpus*). Japan (type), Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 1400 m, 1.V.1972, Horak (ZT 72/428); Wau, Mt. Kaindi, 2300 m, 11.V.1973, Horak (ZT 73/213).

The material gathered in Papua New Guinea agrees in all essential characters with the type described from Japan. *A. neoumbrina* closely approaches *A. subclavata* (New Zealand) and *A. umbrina* or *A. brevispora* respectively (if not conspecific with *A. umbrina*?, Europe).

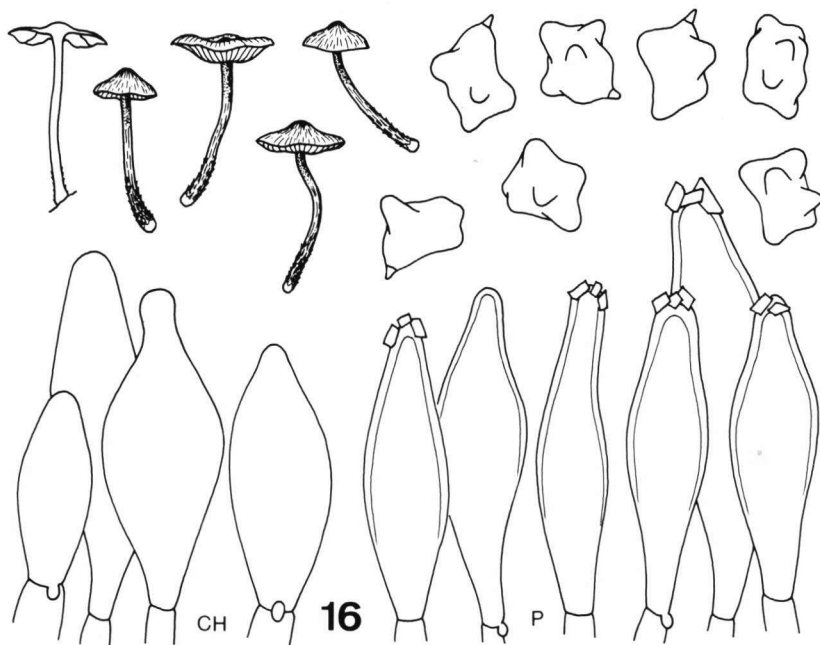


Fig. 16: *A. neoumbrina* (Y. Kobay.) Horak (ZT 72/428): carpophores, spores, cheilocystidia (CH), pleurocystidia (P).

17. *Astrosporina papillata* Horak, *spec. nov.*—Fig. 17

Pileo –25 mm, conico convexo semper papilla conica instructo, brunneo, squamis concoloribus dense oblecto. Lamellis adnatis, ex argillaceo brunneis. Stipite –45 × 2 mm, cylindraco, pileo concolori, fibrillis ochraceis dense instructo. Odore nullo. Sporis 10–12 × 7,5–8,5 μ m, nodulosis. Cystidiis subfusoides, crassetunicatis, incrustatis. Ad terram in silvis quercuum. Nova Guinea. Typus: ZT 72/43.

Pileus –25 mm diam., in young and aged carpophores with prominent conic papilla, convex to expanded; light to dark brown, date brown, densely covered with concolorous minute subsquarrose scales, fibrillose towards the striate margin, membranous, dry, obvious veil remnants absent. Lamellae adnate, occasionally subemarginate, argillaceous turning brown, white fimbriate edges; crowded (L 10–14, –3), ventricose. Stipe 25–45 × 2 mm, cylindric, equal, slender, coloured like pileus or paler, densely covered with light ochraceous fibrils especially towards the base, conspicuous cortina absent, dry, hollow, single, in groups. Context brownish. Odour not distinctive.

Spores 10–12 × 7,5–8,5 μ m, nodulose, with conspicuous conic knobs, brown. Basidia 28–32 × 8–9 μ m, 4-spored. Cheilocystidia 20–30 × 12–17 μ m, clavate, thin-walled, not encrusted. Pleurocystidia 40–50 × 12–15 μ m, fusoid, metuloid (–3,5 μ m diam.), encrusted, hyaline to yellowish. Caulocystidia like cheilo- and pleurocystidia. Cuticle a cutis or trichoderm consisting of cylindric hyphae (8–12 μ m diam.), encrusted with brown pigment. Clamp connections numerous.

HABITAT.—On soil under *Castanopsis-Lithocarpus*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Eastern Highlands, Kainantu, Okapa Road, 7.I.1972, Horak (ZT 72/43, holotype).

This species has the appearance of *A. paracerasphora* Horak, *A. incognita* Horak or *A. punctatosquamosa* Horak all described from Papua New Guinea. However, the rather large spores with conspicuous knobs definitely separate *A. papillata* from the three taxa mentioned.

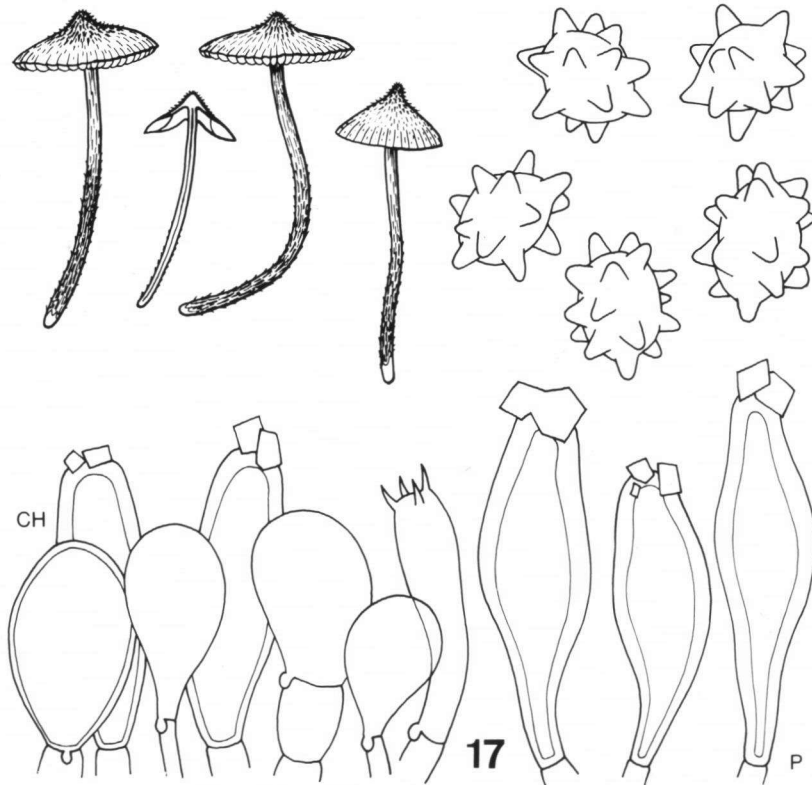


Fig. 17: *A. papillata* Horak (type): carpophores, spores, basidium and cheilocystidia (CH), pleurocystidia (P)

18. *Astrosporina corneri* Horak, *spec. nov.*—Fig. 18

Pileo –50 mm, umbonato-convexo, violaceo-brunneo, rimoso. Lamellis adnexis, ochraceis. Stipite –50 × –8 mm, cylindrico, violaceo, fibrilloso. Sporis 7–8 × 5,5–6 μ m, nodulosis. Cystidiis lageniformibus, tenuitunicatis, haud incrustatis. Ad terram in silvis. Sabah. Typus: ZT 78/55.

Pileus –50 mm diam., convex or plane, with acute umbo; violaceous or violaceous-brown; radially fibrillose becoming rimose, dry, veil remnants absent. Lamellae adnexed, crowded (L –

24, -3); pale yellow to ochraceous, edge concolorous. Stipe 50×8 mm, cylindric, equal, stout; pale violaceous or pale lilaceous, becoming pale yellow; fibrillose-tomentose towards base, pruinose at apex; dry, solid, single in groups. Context whitish, pale brown in stipe. Odour not strong, somewhat like corn.

Spores $7-8 \times 5.5-6$ μ m, nodulose, knobs hemispheric, not well pronounced, yellow-brown. Basidia $26-35 \times 7-9$ μ m, 4-spored. Cheilo- and pleurocystidia $50-70 \times 12-20$ μ m, broadly fusoid to lageniform, membrane thin-walled, hyaline, apex often with yellowish resinous incrustation, crystals absent. Caulocystidia 90×15 μ m, cylindric to subfusoid, thin-walled, hyaline. Cuticle a cutis of cylindric hyphae (3-8 μ m diam.), encrusted with yellow-brown pigment. Clamp connection present.

HABITAT.—On soil in forest. Sabah (–1700 m).

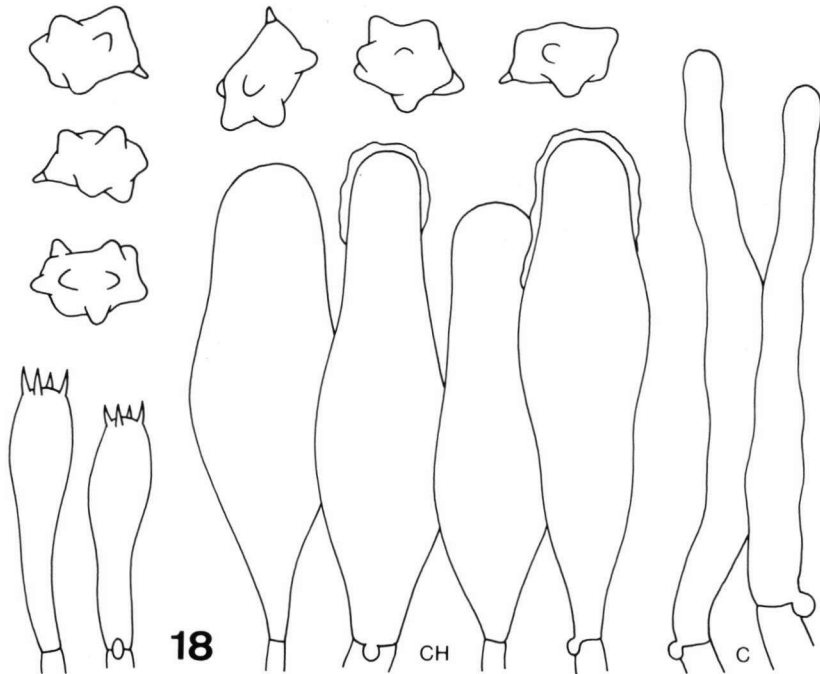


Fig. 18: *A. corneri* Horak (type): spores, basidia, cheilo- and pleurocystidia (CH), caulocystidia (C).

MATERIAL.—SABAH (BORNEO): Mt. Kinabalu, Mesilau River, 20.IV.1964, Corner (RSNB 8367, ZT 78/55, holotype).

Due to the colour and the shape of the carpophores this lilac species recalls *A. magnifica* which grows under *Nothofagus* in montane forest of Papua New Guinea. Microscopically, however, the two taxa are well distinguished by shape and size of the spores and the cheilocystidia.

This particular species is named after Prof. E. J. H. Corner whose numerous collections of *Astrosporina* added much further information about occurrence and distribution of this genus in Indomalaya and Australasia.

19. *Astrosporina magnifica* Horak, *spec. nov.*—Fig. 19.

Pileo—40 mm, convexo campanulato, aetate plano-subdepresso, castaneo-umbrino, squarroso marginem versus rimoso. Lamellis adnato-subdecurrentibus, vinaceobrunneis dein castaneis. Stipite—60 × 7 mm, cylindraceo, pileo concolori, fibrillis castaneis squarrosis oblecto, sicco. Odore nullo. Sporis 6–8,5 × 5,5–6,5 μ m, angulato-nodulosis. Cystidiis clavato-vesiculososis, tenuitunicatis, pigmento castaneo impletis. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 72/747.

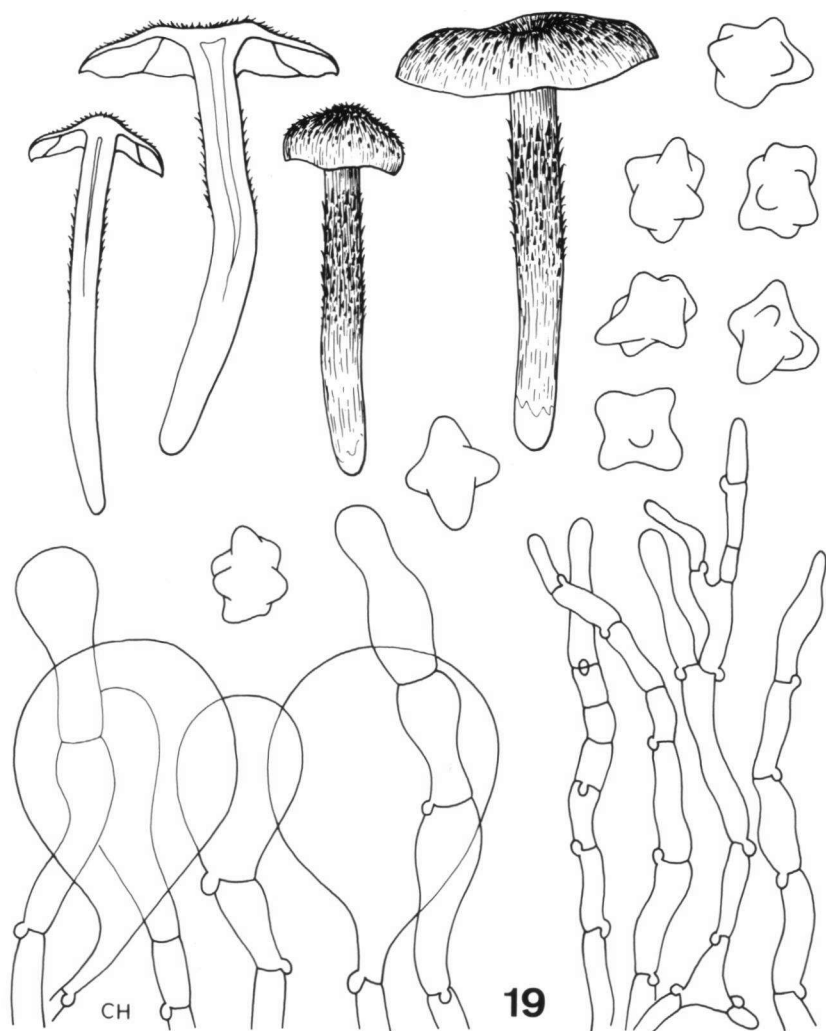


Fig. 19: *A. magnifica* Horak (type): carpophores, spores, cheilocystidia (CH), cuticle.

Pileus 15–40 mm diam., hemispherical becoming convex or campanulate, later expanded and centre depressed; dark brown to chestnut brown; covered with coarse squarrose scales, towards the margin fibrillose-rimose, veil remnants absent, dry. Lamellae broadly adnate to subdecurrent, crowded; wine red-brown turning red-brown or even dark brown, edges darker and fimbriate. Stipe 35–60 × 5–7 mm, cylindric, occasionally attenuated towards the base, terete; concolorous with pileus or black-brown; covered with coarse concolorous fibrils or (nearing the apex) squarrose scales, veil remnants absent, dry, hollow, single in groups. Context wine red or lilac-red all over. Chemical reactions: KOH on cuticle — wine red. Odour none.

Spores 6–8.5 × 5.5–6.5 μ m, angular to nodulose, occasionally cruciform, brownish. Basidia 45–65 × 7–10 μ m, 4-spored. Cheilocystidia 20–70 × 12–35 μ m, clavate to vesicular, thin-walled, not encrusted, in KOH with conspicuous red-brown plasmatic pigment. Pleuro- and caulocystidia none. Cuticle a trichoderm of short cylindric hyphae (5–7 μ m diam.), with in KOH red-brown plasmatic pigment, membranes thin, smooth. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests (*N. carrii*). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Wau, Mt. Kaindi, 2400 m, 4.I.1973, Horak (ZT 72/747, holotype).

Among all species studied in this contribution *A. magnifica* is the most outstanding representative. The fungus is associated with *Nothofagus* (Papua New Guinea) and is readily recognized by the following characters: scales on pileus and upper portion of stipe, wine red context after bruising, small spores and red-brown (KOH) plasmatic pigment in the cheilocystidia and cuticular hyphae.

20. *Astrosporina aberrans* Horak, *spec. nov.*—Fig. 20

Pileo –30 mm, brunneo cervino, squamis squarrosis obtecto, sicco. Lamellis adnexis vel subliberis, brunneis. Stipite –75 × –3 mm, cylindraco, pileo concolori, apicaliter pruinoso basim versus squamoso. Odore nullo. Spor. 11–13.5 × 8–10 μ m, stellato-nodulosi. Cystidiis fusoid-capitatis, tenuitunicatis, haud incrustatis, hyalinis. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 72/361.

Pileus –30 mm diam., conic or campanulate with conic umbo; date brown to dark brown; completely covered with small squarrose concolorous scales, coarsely fibrillose towards the inrolled margin; dry, veil remnants absent. Lamellae adnexed to almost free; crowded, not ventricose; brown like pileus, with white, fimbriate edges. Stipe 40–75 × 2–3 mm, cylindric, equal, slender; concolorous with pileus or paler; apically pruinose, towards the base densely covered with brown flakes and squamules; veil remnants absent, dry, solid, single in groups. Context brown. Odour not distinctive.

Spores 11–13.5 × 8–10 μ m, nodulose, with conspicuous conic knobs, brown. Basidia 25–34 × 10 μ m, 2-spored. Cheilo- and pleurocystidia 40–80 × 10–17 μ m, fusoid-capitate, apex pestle-like (8–14 μ m diam.), thin-walled, hyaline, not encrusted. Caulocystidia absent. Cuticle a trichoderm consisting of short cylindric hyphae (5–8 μ m diam.), encrusted with brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests (*N. carrii*, *N. grandis*). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Wau, Mt. Kaindi, 2400 m, 2.IV.1972, Horak (ZT 72/361, holotype).

Macroscopically *A. aberrans* is reminiscent of several species described above. However, the large stellate spores and the thin-walled and often capitate cheilocystidia define and separate this fungus from all others known so far. Among temperate species of *Astrosporina* from the Northern hemisphere the closest relative is thought to be *A. longicystis* (Atk.).

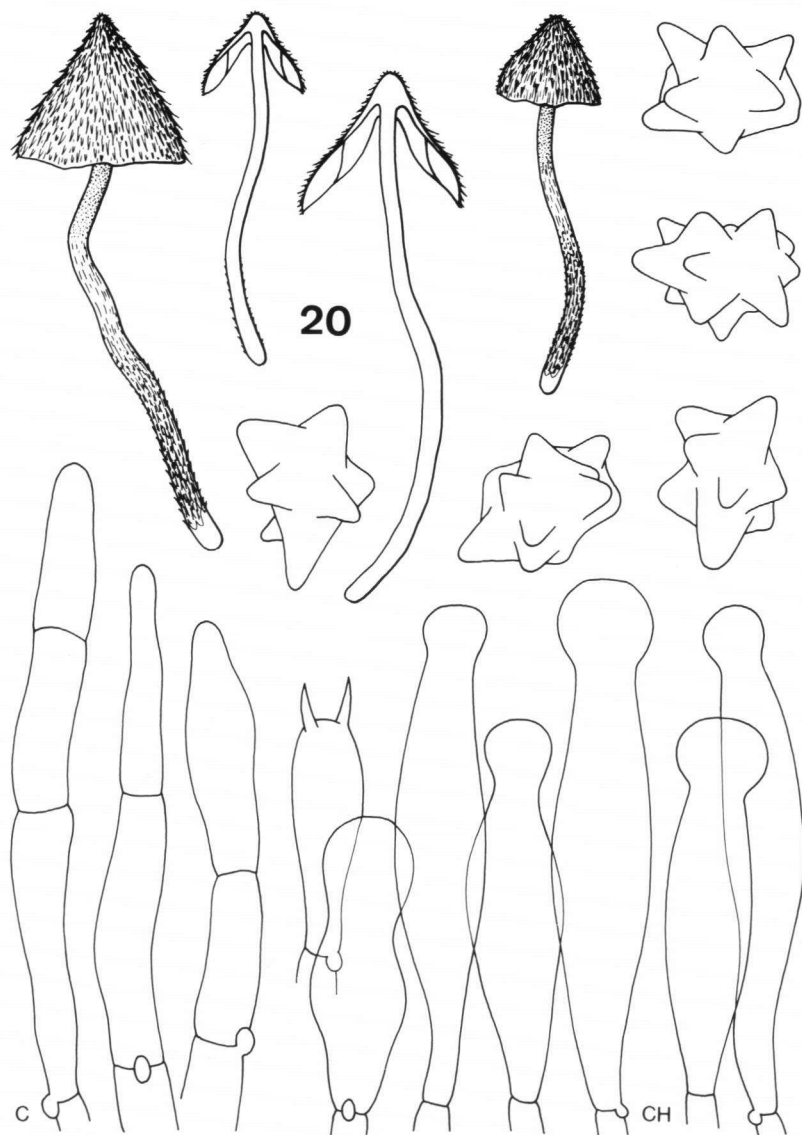


Fig. 20: *A. aberrans* Horak (type): carpophores, spores, basidium with cheilo- and pleurocystidia (CH), caulocystidia (C).

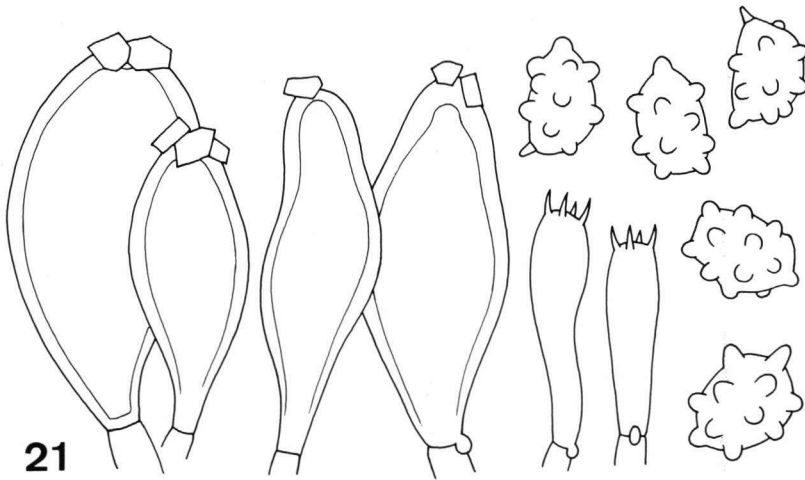


Fig. 21: *A. exigua* Clel. (type): spores, basidia, cheilo- and pleurocystidia.

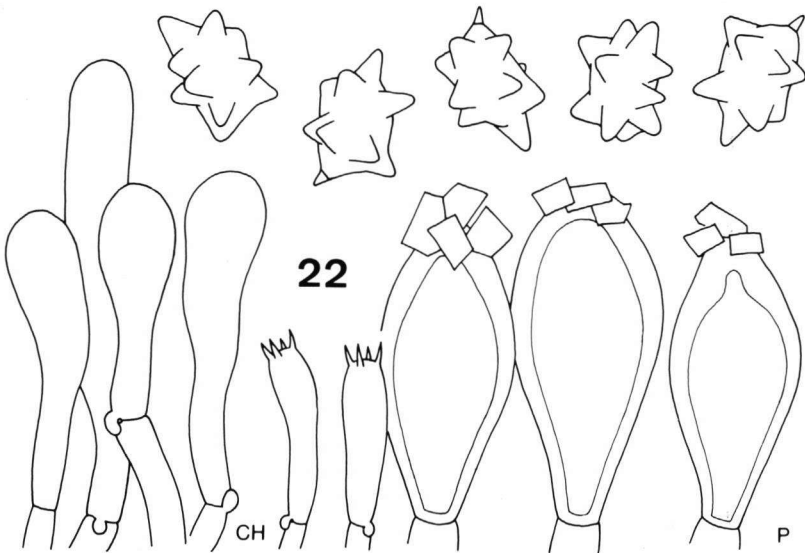


Fig. 22: *A. discissa* Clel. (type): spores, basidia, cheilocystidia (CH), pleurocystidia (P).

21. *ASTROSPORINA IMBRICATA* Clel.—Fig. 23

Astrosporina imbricata Clel. in Trans. R. Soc. S. Australia 57: 192. 1933.

Inocybe murrayana Clel. l.c.: 192. 1933.

MISAPPLIED NAME.—*Astrosporina asterospora* (Quél.) sensu Clel., Toadstools and mushrooms of South Australia: 118. 1934.

Nothing can be added to the macroscopic characters already published.

Spores $9-12 \times 5-6.5 \mu\text{m}$, ellipsoid, with low and rather indistinct knobs or angles (like spores of *Entoloma* spp.), brown, thin-walled membrane, germ pore absent. Basidia $28-35 \times 8-9 \mu\text{m}$, 4-spored. Cheilo-, pleuro- and caulocystidia $50-75 \times 12-20 \mu\text{m}$, lageniform, metuloid, membrane hyaline or pale brown, rarely without crystals, numerous. Cuticle a cutis or trichoderm of cylindric hyphae ($6-12 \mu\text{m}$ diam.), encrusted with brown pigment. Clamp connections present.

HABITAT.—On soil. South Australia.

MATERIAL.—AUSTRALIA: South Australia: Kinchina, 8.VI.1925, Cleland (ADW 12687, holotype); Kinchina, 8.VI.1925, Cleland (ADW 12673, holotype of *Inocybe murrayana* Clel.); Mt. Lofty, National Park, 12.IV.1917, Cleland (ADW 12691, auth. mat. of *Astrosporina asterospora* (Quél.) sensu Clel.).

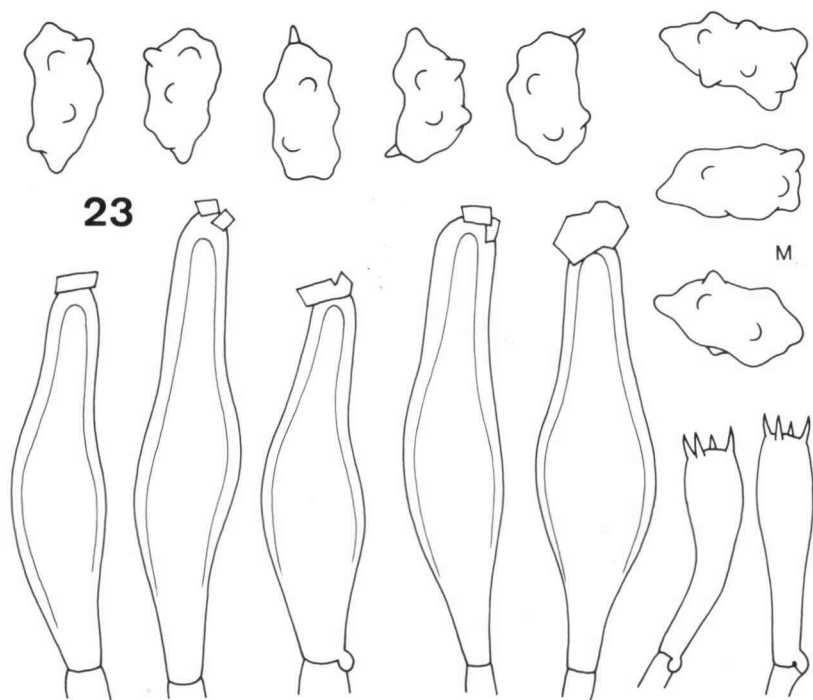


Fig. 23: *A. imbricata* Clel. (type): spores, basidia, cheilo- and pleurocystidia; spores of *Inocybe murrayana* Cleland (type) (M).

This species is recognized best by the particular spores which remind of those known for the New Zealand *A. straminea* Horak (1977). Concerning the shape of the spores several European taxa are related to the Australian fungus, viz. *A. umbrina* (Bres.) Rea, *A. commixta* (Bres.) and *A. rennyi* (Berk. & Br.) Rea.

V. Sect. MARGINATAE Kühner 1933

22. *Astrosporina alboviscida* Horak, *spec. nov.*—Fig. 24

Pileo –25 mm, convexo campanulato, albo, glutinoso, fibrilloso-rimoso. Lamellis griseis dein argillaceis, adnexis. Stipite –40 × –2 mm, cylindraceo, albo, pruinoso, sicco. Odore spermatico. Sporis 6–7,5 × 5,5–6,5 μm, nodulosi. Cystidiis cylindraceo-fusoideis, metuloideis, incrustatis. Ad terram in silvis virginis. Nova Guinea. Typus: ZT 72/515.

Pileus –25 mm diam., convex when young, becoming broadly umbonate-expanded to campanulate; white; glutinous, viscid even in dry weather; smooth at centre, fibrillose-rimose towards the margin, often splitting. Lamellae adnexed to almost free, ventricose, crowded; grey turning argillaceous to clay brown; with white fimbriate edges. Stipe 20–40 × –2 mm, cylindric, equal, slender; white; densely pruinose all over, veil remnants absent; dry, solid, single in groups. Context white. Odour spermatoc.

Spores 6–7,5 × 5,5–6,5 μm, nodulose, knobs conic or often saddle-shaped, ovoid in profile, brown. Basidia 22–26 × 8–9 μm, 4-spored. Cheilo- and pleurocystidia 30–50 × 16–20 μm, cylindric to subfusoid, thick-walled (–5 μm diam.), encrusted, hyaline. Caulocystidia like cheilocystidia, 50–65 × 20–25 μm. Cuticle a cutis consisting of gelatinized hyphae (2–4 μm diam.), cells of subcutis –15 μm diam.; membranes smooth or inconspicuously encrusted with pigment. Clamp connections numerous.

HABITAT.—On soil in coastal rain forest, under *Anisoptera* sp. (Dipterocarpaceae) and *Intsia* sp. (Leguminosae). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Lae, Oomsis, 4.VII.1972, R. Johns (ZT 72/515, holotype).

Among the Papua New Guinean representatives of *Astrosporina* sect. *Marginatae* this species is immediately recognized by its white colour, spermatoc odour, particular cystidia and spores with conic and crested projections.

23. *Astrosporina granuloseiceps* Horak, *spec. nov.*—Fig. 25

Pileo –10 mm, campanulato papilla conica semper instructo, brunneo pallidiori marginem versus, squamis minutissimis oblecto. Lamellis adnexis, argillaceis vel ferrugineo-ochraceis. Stipite –25 × 1 mm, cylindraceo, dilute rubrobrunneo, pruinoso, sicco. Odore ingrato. Sporis 6,5–7,5 × 5–6 μm, nodulosi. Cheilocystidiis clavatis, pleurocystidiis fusoideis, metuloideis, incrustatis. Ad terram in silvis quercuum. Nova Guinea. Typus: ZT 73/239.

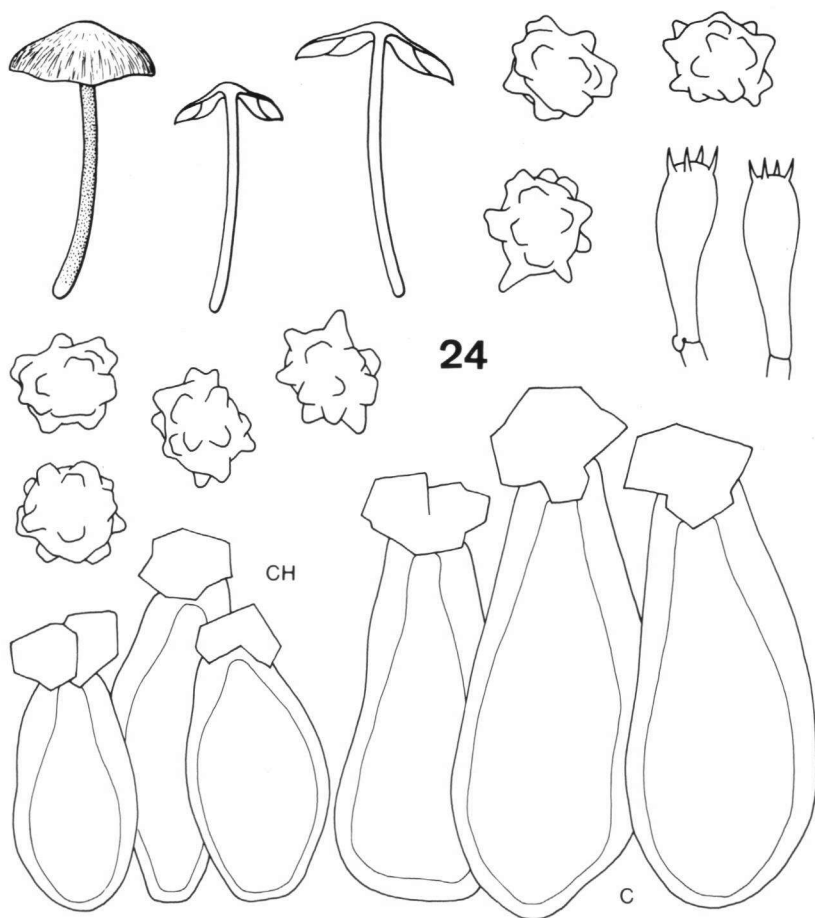


Fig. 24: *A. alboviscida* Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia (CH), caulocystidia (C).

Pileus—10 mm diam., campanulate, with conspicuous conic papilla or umbo; yellow-brown to dark brown at centre, paler towards the margin; covered with minute concolorous squamules, scurfy, granular; dry, but viscid when wet, aged carpophores micaceous, shiny, veil remnants absent. Lamellae adnexed, ventricose, L 8–12, –3; light rust brown, turning rust ochraceous, later deep brown, white fimbriate edges. Stipe –25 × –1 mm, cylindric, equal, slender; yellow-brown to reddish brown; pruinose for whole length, towards base often also with white fibrils; dry, veil remnants absent, solid, single in groups. Context brownish, reddish brown in stipe. Odour pleasant at first; changing to spermatic.

Spores 6.5–7.5 × 5–6 μ m, nodulose, knobs conspicuous, one big conic projection at apical end, brown. Basidia 20–25 × 7–9 μ m, 4-spored. Cheilocystidia 20–35 × 10–20 μ m, clavate or vesiculose, thin-walled, not incrustated, in clusters. Pleurocystidia (and caulocystidia) 35–60 × 10–

18 μ m, fusoid, thick-walled, encrusted, yellow (in KOH). Cuticle consisting of globose, fusoid or cylindric irregularly arranged cells, thin-walled membranes, slightly gelatinized, encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in *Castanopsis-Lithocarpus* forests. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 30.V.1973, Horak (ZT 73/239, holotype); Morobe district, Bulolo, Manki, 16.V.1973, Horak (ZT 73/228).

This peculiar species is recognized best by the small size of the brown carpophores, spores and cystidia. The most distinctive character, however, is the epithelium-like cuticle which is rather unique among the taxa of *Astrosporina* described so far.

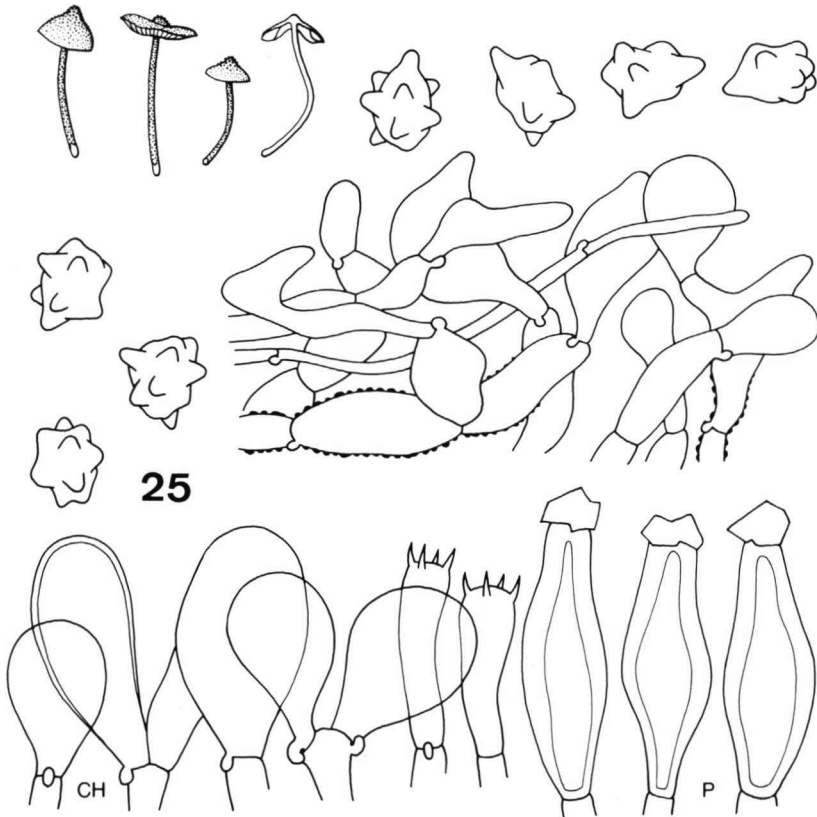


Fig. 25: *A. granuloseiceps* Horak (type): carpophores, spores, basidia, cheilocystidia (CH), pleurocystidia (P), cuticle.

24a. *Astrosporina olivaceonigra* Horak, *spec. nov.*—Fig. 26

Pileo —40 mm lato, e conico convexo campanulato, argillaceo, nigroolivaceo tinctu, fibrilloso, sicco. Lamellis adnexis vel subliberis, argillaceis. Stipite —45 × —2 mm, cylindraco, pileo concolori, pruinoso, sicco. Odore spermatico. Sporis 8–9,5 × 5,5–6,5 μ m, nodulosis. Cystidiis fusoidis, metuloidis, incrustatis. Ad terram in silvis *Castanopsidis*. Nova Guinea. Typus: ZT 72/192.

Pileus —30 mm diam., conico-convex becoming campanulate or broadly umbonate-expanded; disc olive-black, argillaceous towards the estriate margin; fibrillose, slightly rimose when old; dry, without veil remnants. Lamellae adnexed to almost free, ventricose, crowded (L 10–14, —5); beige when young, turning argillaceous or brownish, white fimbriate edges. Stipe 30–45 × —2 mm, cylindric, equal, slender; beige to light brownish; pruinose over whole length, no veil remnants; dry, single in groups. Context light brownish. Odour spermatic.

Spores 8–9,5 × 5,5–6,5 μ m, nodulose, with pronounced conic knob at apical end, brown. Basidia 20–26 × 7–8 μ m, 4-spored. Cheilo- and pleurocystidia 45–60 × 13–16 μ m, subfusoid, metuloid (—3,5 μ m diam.), encrusted, hyaline. Caulocystidia like cheilocystidia. Cuticle a cutis consisting of short cylindric hyphae (3–8 μ m diam.), with conspicuous brown (in KOH) plasmatic (!) and encrusting pigment. Clamp connections numerous.

HABITAT.—On soil in *Castanopsis* forests. Papua New Guinea.

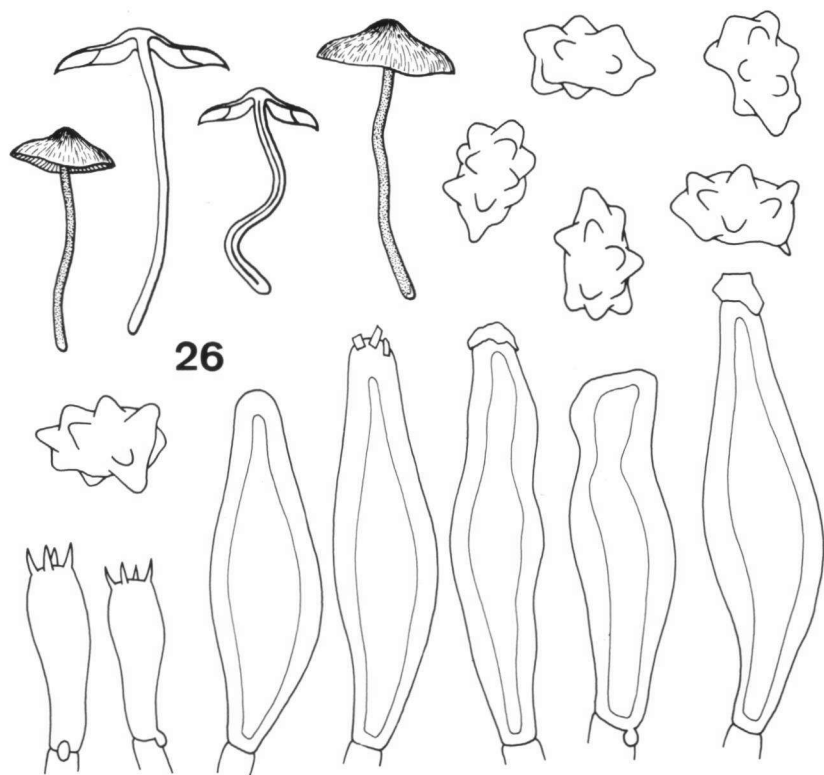


Fig. 26: *A. olivaceonigra* Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Heads Hump, 1200 m, 9.III. 1972, *Horak* (ZT 72/192, holotype); Morobe district, Bulolo, Manki, 21.X.1971, *Horak* (ZT 71/196). Eastern Highlands, Goroka, Mt. Otto, 17.I.1972, *Horak* (ZT 72/102).

In Papua New Guinea this species is common in forests dominated by *Castanopsis*. It is distinguished by the rather delicate carpophores, the olive-black fibrillose pileus and the cylindric pruinose stipe.

24b. *ASTROSPORINA OLIVACEONIGRA* forma *volvata* Horak, f. nov.

Differt a typo volva distincta minuta alba. Ad terram in silvis. Nova Guinea. Typus: ZT 73/128.

HABITAT.—On soil under *Castanopsis* – *Lithocarpus*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 29.III.1973, *Horak* (ZT 73/128, holotype of form); Morobe district, Bulolo, Heads Hump, 21.X.1971, *Horak* (ZT 71/180).

This form of *A. olivaceonigra* is characterized by the occurrence of rather conspicuous membranous veil remnants at the (occasionally submarginate) base of the stipe.

25. *Astrosporina angustifolia* Corner & Horak, spec. nov.—Fig. 27

Pileo –40 mm, hemisphaerico-convexo dein campanulato vel expando, albido, stramineo vel pallide argillaceo, conspicue fibrilloso-rimoso. Lamellis adnexis vel subliberis, angustis, densissimis, argillaceo-brunneis vel stramineis. Stipite –75 × –3 mm, cylindraceo, marginato-bulboso, pruinoso, pileo concolori. Odore spermatico. Sporis 6,5–9 × 4,5–6 µm, nodulosi. Cystidiis fusoides, metuloides, incrustatis. Ad terram in silvis (plerumque fagineis). Nova Guinea. Typus: ZT 72/406.

Pileus 10–40 mm diam., hemispheric or convex when young, becoming campanulate or umbonate-expanded; whitish, straw yellow, pale ochraceous or pale yellow-ochraceous, disc darker, turning argillaceous; smooth to innately fibrillose at centre, fibrillose to rimose towards (the often split) margin, occasionally squamulose around disc; dry, subviscid when moist, estriate, veil remnants absent. Lamellae adnexed to almost free, very narrow and very densely crowded, strongly intermixed (L –40, –15); whitish to yellowish turning argillaceous or brown, edge albobimbricate. Stipe 35–75 × 2–3 mm, cylindric, equal, slender, with small but distinct marginate bulb at base, cartilaginous; concolorous with pileus, pruinose all over; dry, solid, tough, veil remnants absent, single in groups. Context pale yellow-brown. Odour spermat.

Spores 6,5–9 × 4,5–6 µm, nodulose, knobs conspicuous, yellow-brown. Basidia 20–34 × 6–9 µm, 4-spored. Cheilo-, pleuro- and caulocystidia 32–60 × 10–20 µm, fusoid, metuloid (up to 4 µm diam.), hyaline to yellowish membrane, encrusted. Cuticle a cutis of cylindric hyphae (4–10 µm diam.), encrusted with yellowish pigment. Clamp connections numerous.

HABITAT.—On soil in forest under *Castanopsis*-*Lithocarpus*. Papua New Guinea, Indonesia (Java), Sabah (Borneo).

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 1400 m, 25.IV.1972, *Horak* (ZT 72/406, holotype); Bulolo, Manki, 14.X.1971, *Horak* (ZT 71/114); 22.X.1971, *Horak* (ZT 71/199); 1.V.1972, *Horak* (ZT 72/429); Bulolo, Susu, 26.IV.1973, *Horak*

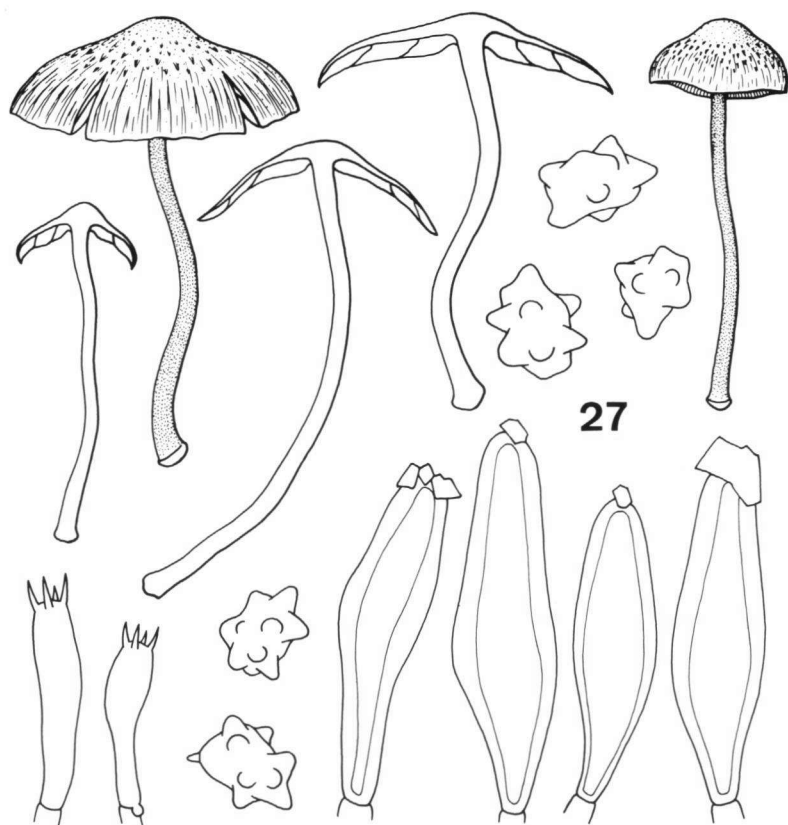


Fig. 27: *A. angustifolia* Corner & Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia.

(ZT 73/190); Wau, McAdam Memorial Park, 30.III.1972, Horak (ZT 72/342); Western Highlands, Mt. Hagen, Baiyer River Hallström Park, 22.V.1972, Horak (ZT 72/475); Trauna Valley Farm, 26.II.1972, Horak (ZT 73/70). — INDONESIA (JAVA): Bogor, Tjibodas, 1800 m, 11.V.1972, Corner (J-2, ZT 79/187); Bogor, Tjibodas, 14.III.1977, Horak (ZT 77/108); 16.III.1977, Horak (ZT 77/200). — SABAH (BORNEO): Mt. Kinabalu, Mesilau River, 2100 m: 7.VII.1961, Corner (RSNB 707, ZT 78/56); 1.IV.1964, Corner (RSNB 8038, ZT 78/57); 13.IV.1964, Corner (RSNB 8273, ZT 78/58); 14.IV.1964, Corner (RSNB 8279, ZT 78/59); 19.IV.1964, Corner (RSNB 8344, ZT 78/60); 21.IV.1964, Corner (RSNB 8385, ZT 78/61); Mt. Kinabalu, Bembangan River: 25.I.1964, Corner (ZT 78/62); 27.II.1964, Corner (ZT 78/63).

According to present knowledge *A. angustifolia* is one of the most widespread species of *Astrosporina* in Indomalaya and Australasia. The fungus occurs in the oak forests of Papua New Guinea, Java and Sabah. Variable in morphology and colour this species is readily recognized in the field due to the following peculiar characters: innately fibrillose to subsquamulose pileus, very narrow and densely crowded lamellae, slender cartilaginous and pruinose stipe (with a small marginate bulb at the base) and spermatic odour.

26. *ASTROSPORINA LUTEA* Kobay. & Hongo—Fig. 28

Astrosporina lutea Kobay. & Hongo in Nagaoa 2: 103. 1952.

Description of the material from Papua New Guinea:

Pileus —30 mm diam., convex to conico-convex becoming campanulate; orange to apricot, covered with concolorous radially arranged fibrils when young, later turning brownish, silky towards estriate margin; dry, veil remnants absent. Lamellae adnexed to almost free, narrow, crowded; orange or deep apricot turning orange-brown, with white fimbriate edges. Stipe 25–45 × 3,5–5 mm, cylindric, bulbous-marginate at base (—7 mm diam.); orange to apricot; pruinose all over, sometimes longitudinally striate; dry, without veil remnants, solid, single in groups. Context orange. Odour unpleasant, like burnt horn.

Spores 5,5–8 × 5–6 μ m, nodulose, knobs conspicuous, brown. Basidia 20–26 × 7 μ m, 4-spored. Cheilo- and pleurocystidia 40–65 × 13–26 μ m, lageniform to fusoid, metuloid, encrusted, hyaline to yellowish (in KOH). Caulocystidia similar. Cuticle a cutis consisting of cylindric hyphae (3–8 μ m diam.), encrusted with orange brownish pigment. Clamp connections numerous.

HABITAT.—On soil in forests (under *Castanopsis* and *Lithocarpus* in Papua New Guinea). Papua New Guinea; Japan (type).

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 1400 m, 28.III.1972, Horak (ZT 72/335), 21.V.1973; Horak (ZT 73/248); Eastern Highlands, Ayura, Kassem Pass, 1850 m, 11.XII.1972, Horak (ZT 72/803).

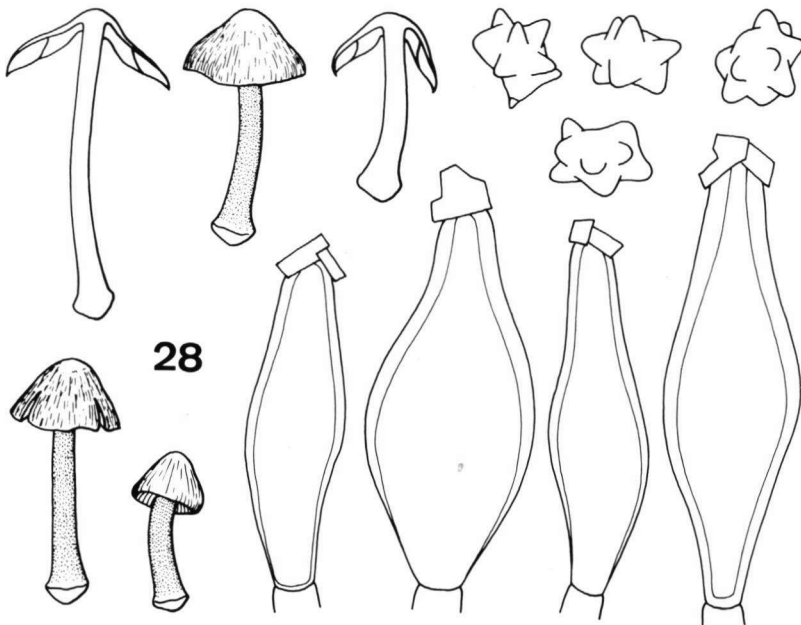


Fig. 28: *A. lutea* Y. Kobay. & Hongo (ZT 72/335): carpophores, spores, cheilo- and pleurocystidia.

Despite some minor differences the material collected in Papua New Guinea is considered conspecific with the type from Japan. The fungus is readily identified by its conspicuous orange to apricot yellow colour on stipe, lamellae and pileus. Another peculiar character is the unpleasant odour described as 'iod-like' by Kobayasi (1952: l.c.) or, according to our observations in Papua New Guinea, like burnt horn.

27. *Astrosporina mediocris* Corner & Horak, *spec. nov.*—Fig. 29

Pileo –30 mm, conico-convexo dein umbonato-repando, fusco-ochraceo, fibrilloso. Lamellis adnexas, pallide argillaceis dein subochraceis. Stipite –35 × –3 mm, cylindrico, marginato-bulboso, albo, senectudine pallide ochraceo, glabro. Odore nullo. Sporis 6–8 × 5,5–7 μm, angulato-nodulosis. Cystidiis clavatis vel fusoides, submetuloideis, haud incrustatis. Ad terram in silvis. Singapore. Typus: ZT 78/64.

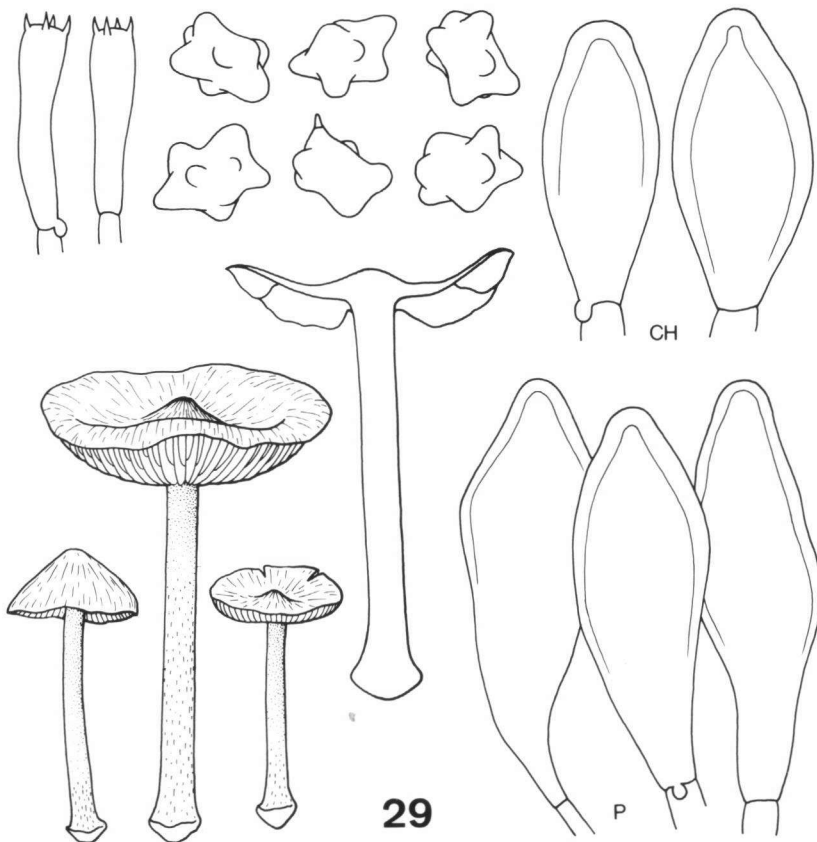


Fig. 29: *A. mediocris* Corner & Horak (type): carpophores, spores, basidia, cheilocystidia (CH), pleurocystidia (P).

Pileus 10–30 mm diam., conic when young, becoming conico-convex or plane with conspicuous conic umbo, centre often depressed in aged specimens; pale ochraceous, covered with radially arranged ochraceous-fuscos or fuscous fibrils, estriate margin with whitish fibrils when young; dry, veil remnants absent. Lamellae adnexed, subventricose, crowded (L –25), narrow; whitish at first turning pale ochraceous, edge concolorous. Stipe 20–35 × 2–3 mm, cylindric, equal, with distinct bulbous or slightly marginate base; white, later turning pale ochraceous, pruinose at apex, glabrous towards the base; dry, solid to fistulose, veil remnants absent, single in groups. Context white. Odour not distinctive.

Spores 6–8 × 5.5–7 μ m, nodulose, knobs hemispheric, yellow-brown. Basidia 22–28 × 7–8 μ m, 4-spored. Cheilocystidia 30–40 × 15–25 μ m, clavate to broadly fusoid, membrane metuloid at apex, with yellow-brown (KOH) plasmatic pigment. Pleurocystidia 40–60 × 15–23 μ m, fusoid to lageniform, metuloid at apex, with yellow-brown (KOH) plasmatic pigment. Caulocystidia absent. Cuticle a cutis of cylindric hyphae (3–10 μ m diam.), encrusted with brown pigment. Clamp connections present.

HABITAT.—On soil in forest. Singapore.

MATERIAL.—SINGAPORE: Botanic Garden, Garden's Jungle, 15.III.1943, *Corner* (ZT 78/64, holotype).

The taxonomic position of this species is near the European *A. napipes* (Lange) Pearson and its relatives. The distinguishing characters are: colour of stipe, shape and size of spores and cystidia.

28. *ASTROSPORINA TITIBUENSIS* Y. Kobay.—Fig. 30

Astrosporina titibuensis Y. Kobay. in *Nagaoa* 2: 110. 1952.

Description of the material from Indonesia (Java):

Pileus –40 mm diam., conic when young soon becoming convex or plane with conspicuous umbo; pale brown to dark brown (especially at the centre), paler towards the split margin; rimose-fibrillose, splitting towards margin in mature specimens, centre densely covered with small squamulose concolorous scales; dry, without veil remnants. Lamellae adnexed to subfree, ventricose, crowded; pale argillaceous-grey becoming cinnamon or pale brown, edge paler. Stipe 25–45 × 2–3 mm, cylindric or slightly attenuated towards apex, with conspicuous marginate (–5 mm diam.) bulb at base; pale pink, white pruinose all over; dry, solid, single in groups. Context pale brown. Odour distinctly fruity, sweet, not spermatic.

Spores 9–10 × 7–8.5 μ m, nodulose, with numerous hemispheric or conic knobs, yellow-brown. Basidia 25–30 × 9–10 μ m, 4-spored. Cheilo- and pleurocystidia 50–90 × 16–30 μ m, clavate to lageniform, metuloid (–3 μ m diam.), membrane yellow (KOH), rarely encrusted with crystals. Caulocystidia similar, apex usually with conspicuous crystals. Cuticle a cutis or trichoderm of cylindric hyphae (3–7 μ m diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in forest (under *Castanopsis-Lithocarpus* in Java). Indonesia (Java); Japan (type).

MATERIAL.—INDONESIA (JAVA): Bogor, Tjibodas, 14.III.1977, *Horak* (ZT 77/94).

The macroscopic appearance and the microscopic characters of the Javanese collection are identical with those reported and drawn in the original description of *A. titibuensis* Y. Kobay. (1952). Habit and the strongly split margin remind of *A. scissa* Horak (1977), but the two taxa are distinctly separated by the shape of the cystidia.

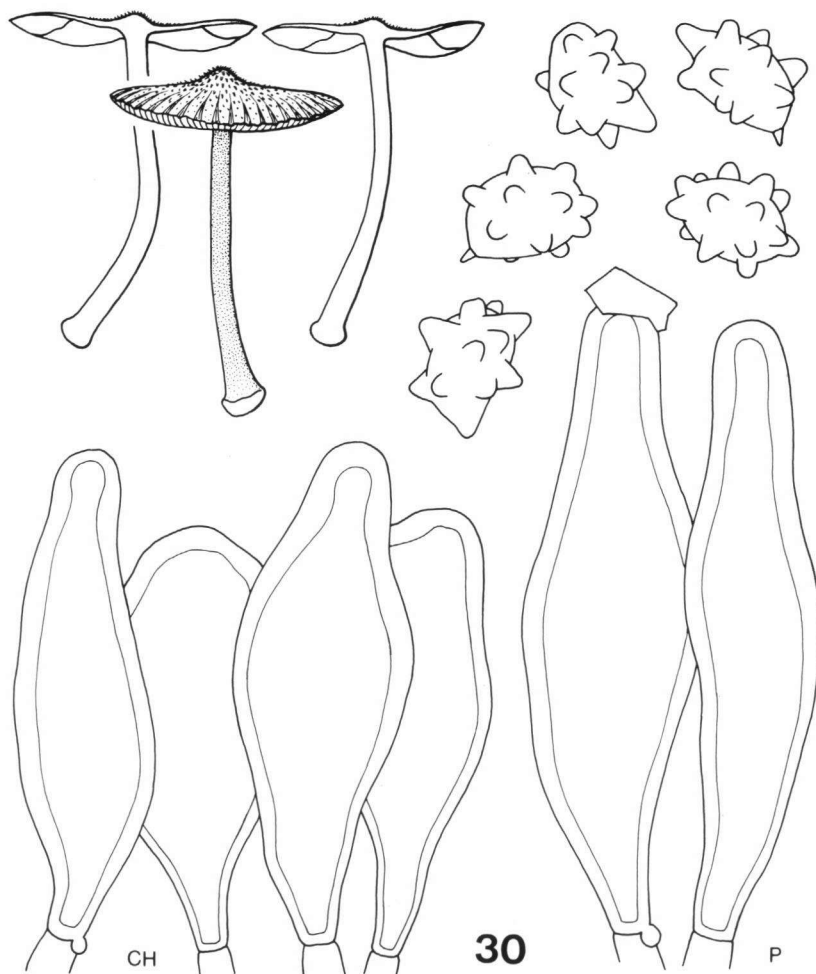


Fig. 30: *A. titibuensis* Y. Kobay. (ZT 77/94): carpophores, spores, cheilocystidia (CH), pleurocystidia (P).

29. *ASTROSPORINA AVELLANA* Horak—Fig. 31

Astrosporina avellana Horak in N. Zealand J. Bot. 15: 744. 1977 (non *Inocybe avellana* Y. Kobay. in Nagaoa 2: 94. 1952).

Description of the material from Papua New Guinea:

Pileus —40 mm diam., hemispheric when young, soon convex with conspicuous conic umbo or campanulate; yellowish, ochraceous, light brown, rarely dark brown; radially fibrillose, disc

smooth but occasionally with minute squamules, veil remnants absent; dry, margin not incurved. Lamellae adnexed to almost free; whitish or grey when young, turning grey-beige to brownish, with white fimbriate edges; crowded (L 14–18, –3). Stipe 20–50 × 1.5–4 mm, cylindric, base marginate, rarely only clavate; white, soon turning cream or yellowish to light ochraceous, in aged carpophores with brownish tint; pruinose all over, veil remnants lacking, solid, single in groups. Context white. Odour not distinctive or slightly spermiatic.

Spores 9–11(13) × 7–9(10) μm , nodulose, with prominent conic knobs, brown. Basidia 22–30 × 8–12 μm , 4-spored. Cheilo- and pleurocystidia 30–70 × 15–25 μm , fusoid, metuloid, encrusted, hyaline to yellowish (in KOH), often intermixed with clavate thin-walled cells. Caulocystidia like cheilocystidia. Cuticle a cutis consisting of cylindric hyphae (4–9 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests. Papua New Guinea, New Zealand (type).

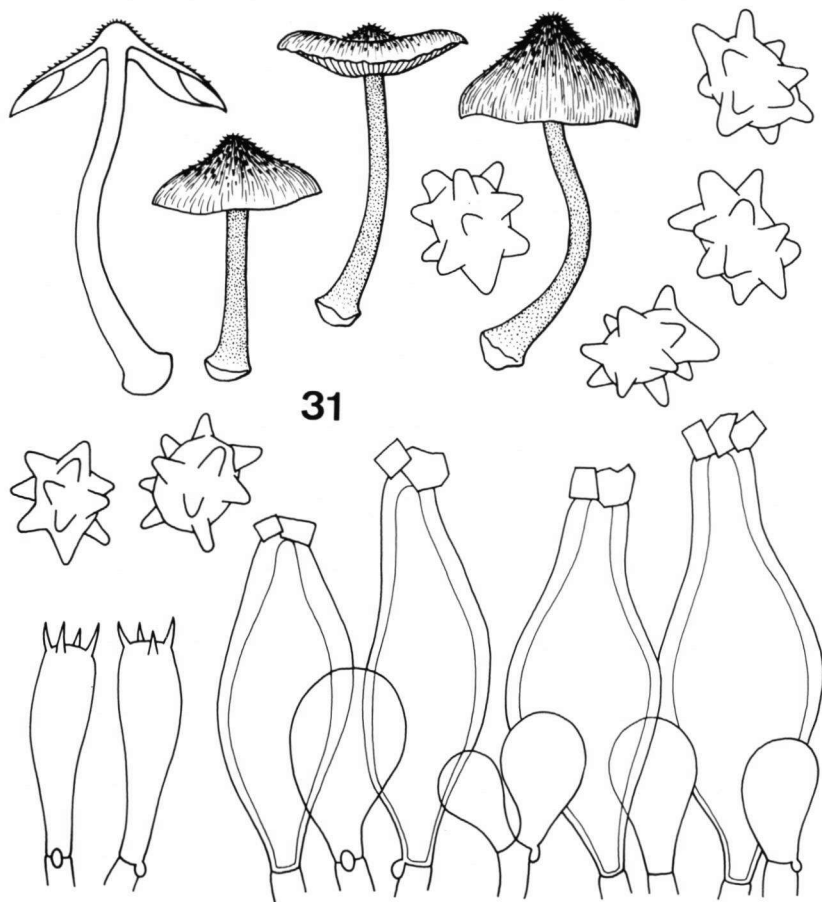


Fig. 31: *A. avellana* Horak (ZT 72/60): carpophores, spores, basidia, cheilo- and pleurocystidia.

MATERIAL.—NEW ZEALAND: Westcoast, Lake Haupiri, 16.I.1968, *Horak* (PDD 27118, holotype). — PAPUA NEW GUINEA: Morobe district: Wau, Mt. Kaindi, 5.XI.1972, *Horak* (ZT 72/588); Wau, Mt. Kaindi, 3 VI.1973, *Horak* (ZT 73/299); Eastern Highlands: Mt. Michael, Frigano, Okapa Track, 4.XII.1971, *Horak* (ZT 71/364); Goroka, Daulo Pass, 12.I.1972, *Horak* (ZT 72/60); Goroka, Mt. Otto, S-ridge, 17.I.1972, *Horak* (ZT 72/103); Western Highlands, Mt. Hagen, Kuna, 20.V.1972, *Horak* (ZT 72/471).

This rather inconspicuous species occurs under *Nothofagus* in New Zealand and Papua New Guinea. Taxonomically it belongs to the group of species around *A. asterospora* (Quél.) Rea which is separated among other characters by distinctly larger spores.

30. *ASTROSPORINA ASTEROSPORA* (Quél.) Rea—Fig. 32

Inocybe asterospora Quél. in Bull. Soc. bot. France 26: 50. 1879. — *Astrosporina asterospora* (Quél.) Rea, Brit. Basidiomycetae: 213. 1922.

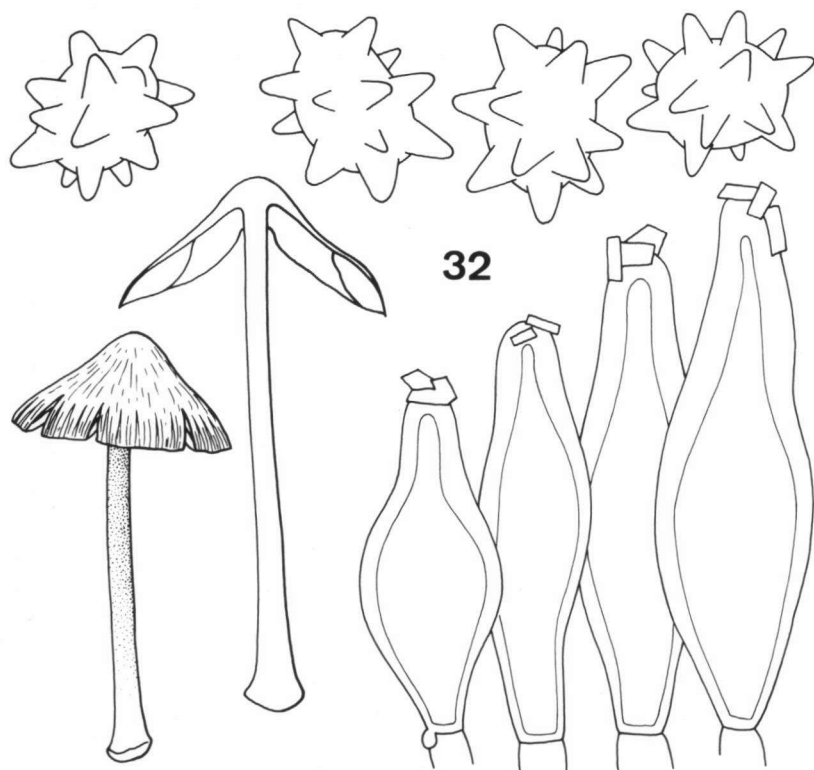


Fig. 32: *A. asterospora* (Quél.) Rea (ZT 78/65): carpophores, spores, cheilo- and pleurocystidia.

Description of the material from Sabah (Borneo):

Pileus 20–35 mm diam., conic or convex with acute or conic umbo; pale brown to dark brown, fuscous, paler towards the estriate margin; fibrillose at first, centre becoming squamulose, margin conspicuously rimose; dry, veil remnants none. Lamellae adnexed, subventricose, crowded (L–15); whitish when young turning argillaceous or pale brown, edge albobimbricate. Stipe 60 × 4 mm, cylindric, base subdiscoïd to marginate-bulbous; whitish, pale brown or ochraceous; pruinose all over; dry, veil remnants absent, solid, single in groups. Context whitish, brown beneath cuticle. Odour none or slightly spermiatic.

Spores 10–14 × 8–12 μ m, stellate, conic knobs very conspicuous, yellow-brown. Basidia 24–36 × 7–12 μ m, 4-spored. Cheilo-, pleuro- and caulocystidia 40–75 × 13–28 μ m, fusoid or lageniform, metuloid, yellow or yellow-brown membrane, encrusted with crystals. Cuticle a cutis of cylindric hyphae (4–10 μ m diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in lowland and montane forests. Malaysia, Sabah; Europe (type), Japan (Kobayasi, 1952: 112 – record doubtful), New Zealand.

MATERIAL.—SABAH (BORNEO): Mt. Kinabalu, Mesilau River, up to 1700 m, 19.I.1964, Corner (RSNB 5015, ZT 78/67); 21.IV.1964, Corner (RSNB 8387, ZT 78/65). — MALAYSIA: Pahang, Tembeling, 8.XI.1930, Corner (ZT 78/66).

All characters observed on the specimens gathered in Malaysia and Sabah are identic with those described from European collections (Kühner & Boursier, 1932; Stangl, 1977). In the Far East this fungus occurs also in Japan (Imazeki & Hongo, 1971) and New Zealand (Horak, 1977).

DOUBTFUL AND INCOMPLETELY KNOWN SPECIES

exigua. — *Astrosporina exigua* Clel. in Trans. R. Soc. S. Australia 57: 192. 1933.—Fig. 21.

Nothing can be added to the macroscopic characters already described. The type material is in bad condition.

Spores 7.5–10 × 6–7 μ m, ellipsoid, with pronounced hemispheric knobs, yellow-brown, thin-walled membrane, germ pore absent. Basidia 25–33 × 8–9 μ m, 4-spored. Cheilo- and pleurocystidia 40–65 × 15–30 μ m, lageniform to clavate, metuloid, membrane hyaline, crystals present. Structure of cuticle unknown. Clamp connections on septa of hyphae.

HABITAT.—On sandy soil. South Australia.

MATERIAL.—AUSTRALIA: South Australia, Adelaide, Hope Valley, 29.IX.1923, Cleland (ADW 12693, holotype).

The infrageneric position of this small brown *Astrosporina* remains doubtful since Cleland in the original diagnosis does not mention absence or presence of the veil or the shape of the stipe. Fresh material is needed to delimit and redescribe this taxon.

emergens. — *Astrosporina emergens* Clel. in Trans. R. Soc. S. Australia 57: 192. 1933.

There is no type material in ADW.

discissa. — *Astrosporina discissa* Clel. in Trans. R. Soc. S. Australia 57: 192. 1933 (non *Inocybe discissa* Fr., Epicrisis: 174. 1834). — Fig. 22.

Nothing can be added regarding the macroscopic characters.

Spores $8-10 \times 6-7 \mu\text{m}$, nodulose, with conspicuous conic knobs, yellow-brown, thin-walled membrane. Basidia $22-26 \times 6 \mu\text{m}$, 4-spored. Cheilocystidia $30-65 \times 7-9 \mu\text{m}$, cylindric to sub-clavate, hyaline, thin-walled, crystals absent. Pleurocystidia $35-50 \times 15-25 \mu\text{m}$, broadly fusoid, metuloid, hyaline, crystals present, scattered. Cuticle a cutis of cylindric hyphae ($5-10 \mu\text{m}$ diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil. South Australia.

MATERIAL.—A U S T R A L I A : South Australia, Upper Tunkalilla Creek, 4.VI.1930, Cleland (ADW 12686, holotype).

The macroscopic and microscopic characters of *A. discissa* indicate that this species is related to the European *A. napipes* (Lange) Pearson. However, the two taxa are readily distinguished by the shape of the cheilo- and pleurocystidia. Since the macroscopic diagnosis lacks several observations important for the taxonomy of *Astrosporina* I prefer to consider this species as 'doubtful' until fresh material is collected again.

EXCLUDED SPECIES

longipes. — *Inocybe longipes* Mass. in Kew Bull. 1908: 1. — *Entoloma longipes* (Mass.) Horak, *comb. nov.*

Type material in K. Full description and illustration in Horak (1979).

rhombospora. — *Inocybe rhombospora* Mass. in Ann. Bot. 18: 48. 1904.

According to the microscopic characters found on the scarce type material (K) this fungus represents a species of *Psilocybe*.

ZUSAMMENFASSUNG

Aus der geographischen Region zwischen Indien und Australien werden 30 der bisher (gut) bekannten Arten von *Astrosporina* Schroeter 1889 (Agaricales) ausgeschlüsselt, beschrieben und abgebildet. 21 Species und eine Varietät sind neu. Die übrigen (z.T. kritischen oder ungenügend dokumentierten) Arten wurden an Hand von Typus- oder authentischem Material nachuntersucht und diskutiert. Die neuseeländischen Arten von *Astrosporina* sind schon früher von Horak (1977) ausführlich beschrieben worden.

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